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THE

PHOTOGRAPHIC QUARTERLY.

EDITED BY

CHARLES W. HASTINGS.

(Editor of "Amateur Photographer," "Photographic Reporter.")

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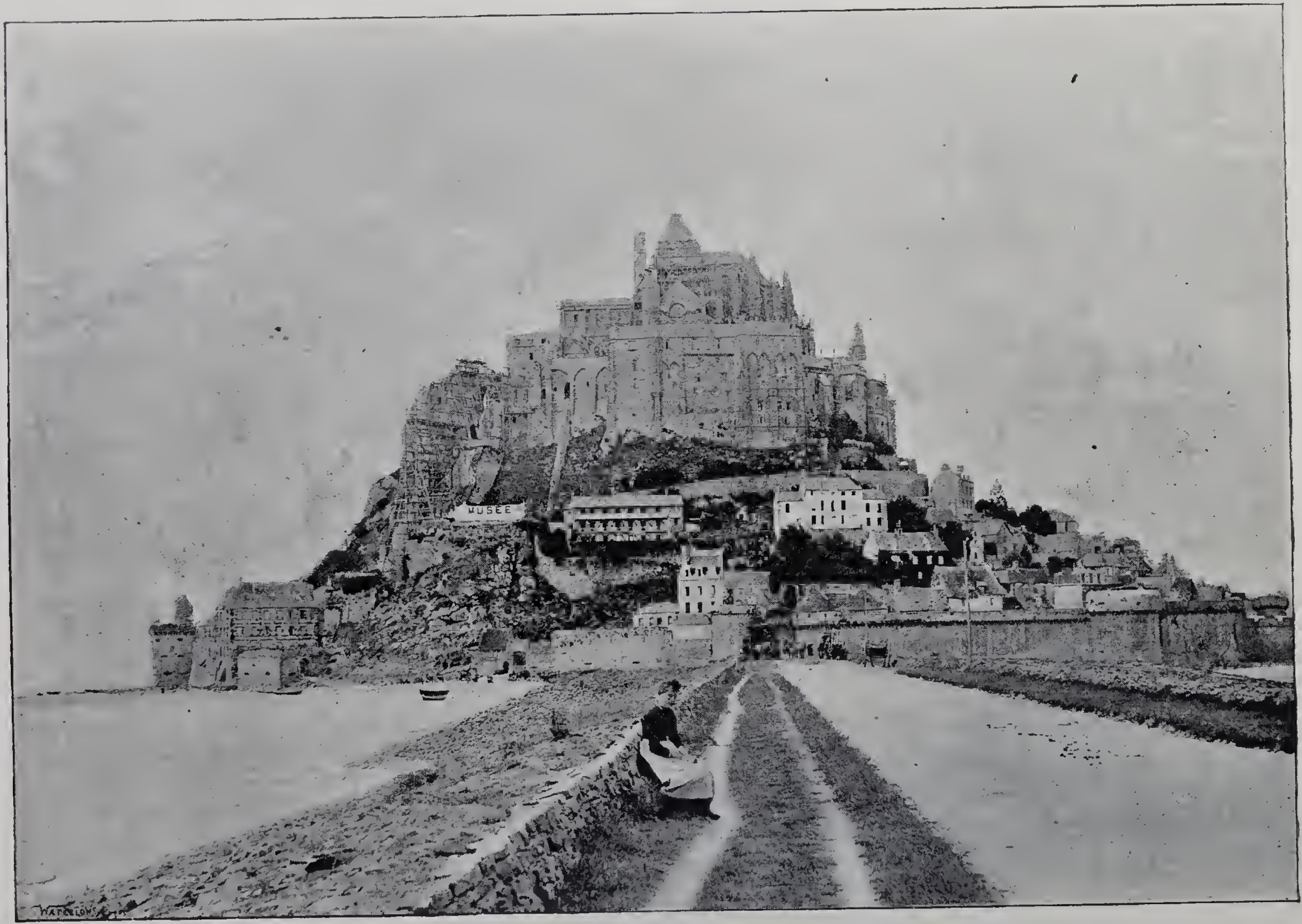

MONT ST. MICHEL, NORMANDY. [Bernard Alfieri.

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VALUES.

LET us take a condensing lens, stand out in the sunshine, focus an image of the sun on a sheet of white paper, and watch the result; the image looks brighter than the paper, and after a time scorches it. Let us now try and realise from the heat produced how much brighter the light spot must have been than it appeared to be. Yet a large amount of the heat must have been reflected and lost, whereas only a small portion of the light was absorbed; for repeat the experiment on a piece of brown paper, and the heat rapidly scorches it.

The image on the ground glass of the camera is a similar image; every point of it consists of concentrated reflected light, and though some of it is lost and dispersed in passing through the glass, it still remains much more vivid than nature; thereby revealing fresh beauties in colouring which we had not observed in the original. It is no marvel, therefore, that photographers have so often fallen in love with this image, and longed to reproduce it in all its beauties. This hope is delusive, as we have no means of reproducing the high lights of nature in their proper brilliancy, much less in this concentrated form; we can, however, by skill give an imitation which more or less satisfies the eye, and is known as painting. The keynote of this process is that the eye by the contraction of the pupil tries to limit the amount of light entering it—as in the above-mentioned experiment of the burning glass—and so is satisfied with accepting the high light in a picture as a representation of sun or moonlight, as the case may be. To do this at present requires long study and practice, and what can be done in colour by photography in this direction is a question for the future.

Let us consider, however, whether photography, at present, represents nature so satisfactorily in monochrome that we are justified in wishing to grapple with all the difficulties of colour. I am afraid artists would answer in the negative, and say that if the average photographer were an art-student, he ought still to study for some time longer before attempting it.

There are certain exceptions, especially in portraiture; but then so much of this work is done by hand, and often by those who have studied art, that it lies outside the scope of this article, which deals mainly with landscape work.

If a black and white and a photographic exhibition are visited in succession, the ordinary individual will generally prefer the former; and it is certainly worth our while to examine the reasons for this preference.

In the matter of drawing the photographs will probably be equal, if not superior, to the hand-drawn pictures; but, on the other hand, will want that emphasis or slight exaggeration which gives force to a drawing, according to the well-known dictum that "Art is Emphasis." The exact delineation of a lens may be considered as fully compensating for this, especially as the more detailed a drawing is, the less is the emphasis that can be given. The compositions of the artists will probably be, as a rule, better: in this point photographers have not as much freedom as draughtsmen: but in many cases a little extra knowledge and thought would do a great deal, especially if combination printing were utilised. Lastly, the scales of shades to express distances, trees, and shadows, will generally be found to be different in the two exhibitions, and cause the artist's one to be more pleasing to the observer, unless he suffers from what might be called photographic colour-blindness, and considers green a dark colour. It may be urged that this is an inherent defect of the photographic plate; if, however, we wish to get a satisfactory effect in monochrome, it must be overcome, either by altering the composition of the plate, or else by altering the nature of the light reaching it, probably in both directions; a suitable exposure and development being taken for granted. Otherwise whatever printing method is adopted, the result will be liable to be false in tone, and unsatisfactory.

These scales of shades are known by the name of *values*, and consist of the light and shade of an object modified by its apparent colour, as compared with the other objects in the picture; and it is by a true rendering of these values that reality and solidity is given to a drawing.

A good example of the foregoing is to be found in one of the older processes of water-colour paintings, of which there are many examples in existence.

It was the practice to lay in all the shades of a picture by means of some form of neutral tint, generally made by a mixture of indigo, sepia, and crimson lake, and over this were washed the local colours of the various objects, or else the neutral tint was mixed with the local colour, so as to give the shades.

On this foundation the shadows were drawn in such a way and to such a depth as to make the scale of values in the picture proportionate to those in the original. According to the ability with which this is carried out depends the success of the result. I think that a similiar method of studying a view is about the most useful one that a photographer can adopt. And it is with a view of assisting in the understanding of these colour values that this article is written.

It was soon perceived that the opaque and weaker colours, such as yellow ochre, light red, etc., had to be used for the distance; and the stronger ones, such as crimson lake, Indian yellow, Prussian blue, were suitable for the foreground. Experiments proving the truth of this are easily made on weakly printed bromides. The *rationale* for this is as follows:—

Light consists of waves of varying length, the longest being at the red end of the spectrum, the shortest visible ones being at the violet end, and beyond are the shorter invisible, but yet photographically active rays. The shorter waves are easier turned back by small obstacles—to them relatively larger—such as dust, moisture, and the various substances in the atmosphere, with the result that the distance is always more or less blue, and also, as photographers know well, often very opaque, owing, no doubt, to the reflection of invisible rays in addition to the blue ones ; this also causes the setting sun to look red or orange, owing to the blue rays not penetrating the damp-laden lower strata of the atmosphere. The local colours of the distance are therefore truly rendered by broken opaque weak colours, reflecting a large amount of light, whereas the foreground admits of purer, stronger, and transparent colours, reflecting the light from the white paper through them.

In attempting to represent Nature on paper or canvas we find ourselves face to face with the difficulty, that the whitest paper or paint in shade (and pictures must naturally be so viewed) is far less brilliant than the high lights of Nature in sunlight ; also our deepest black has neither the transparency of Nature's darkest shades, nor is it dark enough in comparison with our high light to counterbalance the deficiency of brilliancy of the latter. We are thus forced to work by an artificial scale, wherein the tints are so arranged, that though they do not represent the actual tints, yet the impression produced on the eye is a fair counterfeit of that given by the actual scene. In portraiture the difficulty is modified because the range between the light and shade is not so great.

For instance, a fairly satisfactory portrait can be made with a lead pencil, whereas it is a most unsatisfactory implement for landscape work, even when carried to the perfection Mr. Harding did.

It is the true rendering of these values that makes one of the main difficulties of the art of painting, because the knowledge is only gained by long and careful practice.

Various methods have been suggested to facilitate this work, such as looking at objects with half-closed eyes, by which means the smaller lights and shades are suppressed, and the broad masses stand out more distinctly; and on the basis thus given a sufficiency of detail can be placed so as to give the effect. This process, I think, is hardly suitable for the photographer, as the lens will infallibly delineate most of these distracting details.

As the photographer, however, wants to study the effect of the general lowering of tone, which is necessitated by the imperfections of our power in rendering light and shade, and so to limit the scale of light and shade in nature, a more useful method is to use the blackened reflector, known as the Claude mirror. This instrument is, I believe, more used abroad than in England; at any rate, it is not easy to get here.

The Claude mirror is a convex glass, blackened at the back, and is rather expensive. Mine, which I got abroad, and which is the size of a quarter-plate, cost about ten shillings; a good enough one for the purpose could be made by covering the inside of a square crystoleum glass with an opaque black varnish, such as Bates' Black, and the cost would then be only a few pence.

These mirrors give very much the tone and appearance of an oil painting; a trifle darker, perhaps, but still fairly close, and are often used for painting from. It, however, enables the values to be easily studied, and by means of a card, white on one side and black on the other, their values can be compared with black and white.

By photographing a view, and taking a print together with the mirror to the original spot, at a time when the lighting is similar to the original lighting, the two can be carefully compared, and it can be seen how close we have approached to what may be called the artistic rendering.

It can also be used as a view finder, for choosing places to photograph, and is superior to the ordinary concave lenses, in the point that it does not increase the brilliancy of the picture by focussing the light on smaller spaces.

We may fairly consider that a photographic plate is capable of rendering exactly the form, light, and shade of an object, as long as it is of one uniform colour, or if it is illuminated by monochromatic light; a good example of which is the beautiful way it represents statuary. Our real difficulty lies in rendering the true value or tone of colour. The study of colour is a long and difficult one, and our eyes want careful training even to see the true colours in nature; and this is one of the reasons why beginners' paintings are so hard and crude, for it is manifestly impossible for them to put on paper the true colours of Nature when they do not even see them. It will, however, be sufficient for the present purpose to study the effects of some of the purer colours. As to the effect on the eye: the most brilliant colour to the eye is a bright yellow-green, such as is got by mixing lemon yellow with emerald green; a bright yellow, such as lemon yellow, comes very close to it in brilliancy, the proportion being about eleven to ten. Yellow, however, approaches nearer to the colour of light, and it is therefore usual to consider it as the brightest colour; in fact, if a wash of lemon yellow is put on white paper, its brilliancy will almost equal that of the paper, whereas a yellow-green will stand out more distinctly. Next comes pure green, which can be made by mixing a little lemon yellow with emerald green, so as to destroy its blue tinge. Next in order of brightness comes scarlet; pure scarlet is the only pigment approaching this colour, but vermillion, or red sealing-wax, may be taken as an example. Next comes pure red and pure blue, which are about equal in brilliancy. Carmine is a fair example of the red, and German ultramarine, known as permanent blue, of the blue: and the darkest colour is violet, formed of ultramarine and crimson lake, this may be considered as only a tenth part as bright as yellow; at each end of the scale come white and black—white representing the purest light, and black absence of light. White lightens all colours, and black deepens them, giving what are called shades of colour. It is impossible to give numerical values of these colours, as so much depends on the shade; but judging from the published drawings of the visible spectrum, I should roughly estimate them by the following numbers. Taking violet as unity, red and blue are twice as luminous, green eight times, and yellow ten times as luminous.

It is usual with artists to treat of only three primary colours, namely, red, yellow, and blue, as the others can be made of mixtures of these, and to produce harmony the following proportions ought to be used :—Yellowthree parts, red five parts, and blue eight parts; these numbers are sometimes of use in judging of the capabilities of a view in producing a harmonious picture.

Pure colours appear very rarely in nature, and then only in the foreground, as owing to the dispersive powers of the atmosphere and reflected lights they get very rapidly modified. White forms the only exception, though even this colour is slightly altered, generally being made yellower by distance; even black, owing to the light it reflects, alters very soon. This is easily seen by comparing a black object with one some distance off; for this reason the black sights of a rifle will stand out distinctly from the black bull's-eye of the target. Pure black, therefore, ought only to be used in the foreground of a picture, whilst white may be used everywhere to express light; this fact is noticed by Fresnoy in his "Art of Painting."

> "White, when it shines with unstained lustre clear,
> May bear an object back, or bring it near.
> Aided by black, it to the front aspires;
> That aid withdrawn it distantly retires.
> But black unmixed, of darkest midnight hue,
> Still calls each object nearer to the view."*

The pure colours act, however, as a sort of measure of the values of local colours, acting something like a yard measure in measuring distances, and thus serve as a basis of comparison, whereby we may form an idea of the intensity of the colouring in nature.

A good example of this is obtained by placing a pure blue against a blue distance, when it will be at once seen how broken and faint the true colouring is.

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* I am indebted to Barnard's "Landscape Painting" for this quotation.

The prevailing colour of landscapes, namely, green, is worthy of further consideration, as from some cause it appears invariably greener to the eye than it really is; as a matter of fact, it is neither so intense nor so green as it appears; in fact, a large amount of red enters into its composition. It is very difficult to realise this, but it is easily proved by looking at trees, etc., through a piece of blue glass dyed with cobalt; these glasses can be procured for about a penny or twopence from an optician or operative chemist. This cobalt glass, if deep enough, will stop all the rays (except a small amount in the yellow green), from B to F in the spectrum; that is to say, all the yellow and green, and a portion of the orange or scarlet rays; the ordinary depth will stop only part of these, admitting some white light through, but quite sufficient for the experiment. On looking at a landscape through one of these glasses it will be seen at once how much red is reflected from apparently brilliant green objects; it will also be perceived what different amounts of red and blue different greens, of apparently the same colour, reflect; and the reason why grass is so apt to come out "patchy" in a photograph will be at once realised. This point ought to be carefully borne in mind, both in landscape painting and photography.

A bromo-iodide of silver photographic plate is sensitive in a different manner to the eye; its maximum sensitiveness is in the blue rays of the spectrum; if the silver salt is in collodion (wet plate) it is hardly sensitive to the yellow and red rays, whereas in gelatine (dry plate) its sensitiveness extends to the yellow, and also well into the red rays; in both cases it is sensitive to a large number of the invisible rays. And it is by the help of photography that we are indebted to our knowledge of the ultra-violet dark part of the spectrum; a part of which we are only otherwise cognisant of by means of fluorescent substances.

Different plates, no doubt, vary in their degrees of comparative sensitiveness, but still it is necessary to have some idea of their scale of values, which can be approximately found out by experiment. The following numbers, published by Monsieur Léon

Vidal in his *Calcul des Temps de Pose,* may, however, prove of use.

"Take an ordinary whitish building, or any other similar object in diffused light, as unity, then if it were dark grey it would require twice the exposure; if green or light brown three times; if a bright yellow four times; if bright red five times; if dark yellow, brown, or green ten times; and if dark red or black twelve times the exposure."

I have increased the exposure from ten to twelve in dark red and black in order to harmonise better with his sunlight exposures.

Taking the spectrum of a bromo-iodide dry plate, as given by Abney, the sensitiveness of a plate to colour would approximately be as follows: take pure blue, as unity, then green wants three times the exposure; yellow five times; scarlet seven times; and crimson ten times the exposure.

There still remain the invisible actinic rays to consider; these rays are not always present to the same amount, and are usually less numerous in winter than in summer; but judging from the way the actinic power of light varies, when apparently there is no visible difference, their quantity must be continually changing. The only way of judging of them that I know of is by finding the time a piece of sensitised paper will take to darken to a certain tint; there are various actinometers made on this principle, but they are not much used, as after a certain amount of practice a photographer seems able to judge of the power of the actinic light present.

In studying the way a photographic plate is impressed by the colours of Nature, it is advantageous not to be compelled to trust always to the negative or print, valuable as such assistance is, but, if possible, to see with our own eyes the effect.

As blue is the most actinic colour in the plates we use it has been often recommended to use a blue glass for that purpose, as it is evident a blue glass will make blue the predominant colour in the view. These blue glasses are generally dyed with cobalt.

Now cobalt, as explained before, stops part of the red, the yellow and green, except a small part of the yellow green, which is faint; it gives, therefore, only a rough idea of the effect. A solution of ammoniated oxide of copper absorbs, however, the red, yellow, and part of the green rays; it is, therefore, very suitable for the purpose, especially as it only completely absorbs these rays when very deep, and the colour can be regulated by diluting with water as required. This solution can be easily made by adding liquid ammonia to a solution of a salt of copper, such as sulphate of copper, and when made from this salt can be crystallised.

For use it may be put into a flat cell, such as a zoophyte trough, sold by microscope dealers, or a cell can easily be made out of old negative glasses, the sides of the cell being made of wood, or glass, or india-rubber, attached by means of a waterproof cement, such as bicycle cement, or Prout's elastic glue, sold by shoemakers at about a penny per stick.

On looking through this solution we can get a very fair idea of the photographic effect of a view, and thus get an idea of how the values of nature are given in photography. This solution, for instance, will at once show the dark shade of ceilings and corners, which are so troublesome in "Interiors."

We are now in a position to enter upon the theory of turning the photographic rendering of values of colours, approximately, into those given by the eye; but in doing so we must treat the important colour green as a primary colour. This is scientifically correct, as green is a pure colour, and is not a mixture of yellow and blue, as it would be by the artistic rendering of three primary colours—namely, red, yellow, and blue. In fact, according to modern investigations the eye is sensitive to three lengths of waves of light, namely, the long ones, the short ones, and one set between the two; that is to say, to red, green, and violet; on this theory yellow is a mixture of red and green waves, and blue of green and violet rays. For full details of the reasons for coming to this rather startling decision I must refer the reader to Helmholz and other modern writers on the matter. At any rate, if we decide on treating green as a mixture of blue and yellow, and not as a pure colour, we shall find ourselves in difficulties.

At first, looking at the visual and photographic intensities of the various colours, this would seem to be impossible; a little further consideration will show a way out of the difficulty. Evidently our first consideration must be the blue and violet rays, as these are excessively actinic. Now if a plate is exposed correctly for any other colour, say green, it is manifest that the blue and violet rays will be over-exposed, and will, therefore, have probably undergone partial reversion. The result will be that the deposit of silver they will give will have lost its opacity, and will have got more transparent—an effect we know well in landscape skies. Also, the blues we find in Nature, and which lie mainly in the sky and distance, are really very weak colours, and reflect a large amount of white light, and are, therefore, more or less correctly represented by a denser deposit of silver. Having thus lowered the intensity of the blue rays, we are able to turn our attention to the red, green, and yellow. On studying these, in comparision with the visual rays, we shall see that what we require to do is to increase the actinic power of the yellow largely, and to a small amount the green. That is to say, that we must really increase the sensitiveness to the yellow rays, and by doing so we shall probably increase the green rays sufficiently.

There are two ways of doing this, either by making the plate more sensitive to yellow, or by altering the light reaching the plate by making it richer in yellow rays. The first method is adopted in the plates known as Orthochromatic and Isochromatic, which, by means of a dye, are made more sensitive to the yellow rays, and in some cases to the red rays; the second, in using a screen of yellow glass, so as to make the light of a yellow colour. Either process may be used separately, or, if required, they can be used together; for example, in copying an oil painting, which usually contains a large amount of yellow, an orthochromatic plate, with a deepish yellow screen, would probably give the best result.

A great deal has been written latterly about these orthochromatic plates, and, as is natural, various opinions have been expressed about them. Some persons seem to have come to the conclusion that if they are used without a screen there is no difference between them and ordinary plates. Such has not been my experience in those I have used, as they seem to me to be distinctly more sensitive to yellow rays. Perhaps one of the reasons for this divergence of opinion is the failure to give green its proper place as a primary colour, and to consider it as a mixture of blue and yellow. For example, take two greens of the same colour, but of different shades; in treating green as a primary colour the darker green is made by mixing black with the lighter green, that is to say, the darker green reflects back less light than the other; if, however, green is looked upon as a secondary colour, the light green is made from the dark green by mixing yellow with it. Now let us photograph these greens on two plates, one an ordinary one, and the other an isochromatic one, both of which are equally sensitive to green, whilst the isochromatic one is more sensitive to yellow. The results ought to be the same if green is treated as a primary colour, but different if it is considered a secondary colour, namely, as a mixture of blue and yellow. If the results are identical it is evident that the person working on the secondary theory of green would be disappointed, and conclude that the plate more sensitive to the yellow rays had no advantage over the other, whereas the theory would be really in error.

These plates may be considered as a useful addition to our powers of translating the tones of nature; it must be remembered, however, that they retain the great defect of being too sensitive to the violet and blue rays.*

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* It would be a great assistance to the scientific study of the way colours are rendered by photography if some one would publish the way in which the solar spectrum is rendered by these orthochromatic plates. As it is, I have never seen any spectrum or measurements from one relating to these plates. A book containing the sensitive curves of photographic plates and paper processes would, if published at a reasonable price, be very useful.—J. G. P. V.

The other plan is to use a yellow screen; this is, as far as I can see, one of the best ways of approximating the values of the colours, as given by the photographic plate to those given by the eye. The yellow screen may be used either with the orthochromatic or the ordinary plate. The ordinary plate will, however, require a deeper yellow, in order to bring its sensitiveness to yellow up to that of the isochromatic; and this, of course, entails a longer exposure. The results, however, by means of a screen of proper depth can be made very similar. The increase of exposure is not so great, as far as I know, as some people seem to imagine. I tried some Castle plates by means of a Warnerke sensitometer, using burning magnesium, as the source of light, on three yellow screens of different depths, and found that the lightest required three times the exposure; the next seven times; and the deepest fourteen times; the deepest of these cuts off almost the whole of the violet and blue, and makes half the green from *b* onwards quite dark and bluish.

Yellow screens work in a double way: first of all, they give a yellow light, and, secondly, they cut off the blue and violet rays; the exact proportions cut off depend on the material used as a dye. Referring back to the comparative intensities of the visual and photographic rays a yellow screen with a tinge of green in it would seem to be about the correct thing.

These screens can be readily attached to the camera behind the lens. It is evident that they must be chosen carefully, so as to alter the light to the amount required, otherwise we shall be in danger of falsifying the values. Photography is an exact science depending on delicate chemical and optical laws; we ought, therefore, carefully to eliminate, as far as possible, all elements of chance. The absorptive properties of the screens must be known beforehand, and for this purpose a pocket spectroscope is very convenient, though an ordinary triangular prism would probably suffice, and is cheap. We must, also, have several screens of different depths, so as to be able to grapple with the varying effects of light with which we may have to deal.

In deciding on the depth of screen to use we must remember that the shadows of objects are not only caused by the absence of light, but that they are also lit up by reflected light from the sky and surrounding objects, and by a certain amount of diffused light. Now photographic plates seem to be much less affected by reflected light than one would at first think; a good example of which is the slight way they are affected by the reflected light from the ceiling of a dark room; in fact, I have often changed and developed plates by means of a candle with a coloured screen round it, and no protection on the top of the screen, to avoid the light being reflected from the ceiling; and the plates have not been fogged, though the smallest ray of direct light would have done so immediately. We must, therefore, be careful not to cut off too much of this reflected light, or else we shall get no detail in the shadows.

Acting on the above suggestions we may consider that we have got a method of representing the tone of colour on a photographic plate, in a similar graduation to that given by the eye, and shall now be able to undertake their study from the artistic side, so as to get the best result our materials can give.

Owing to the fact that our power of expressing light is limited by white paper, and that of expressing shade by black, we are obliged to work on an artificial scale of colouring. In doing this we must be careful that the principal gradations truly represent the values of nature; the minor ones must be expressed according to the artist's feeling, but yet on them depends a great deal of the success of the picture. White, owing to the optical construction of the eye, and also to the peculiarity that bright objects have the appearance of being larger than they are (caused by what is known as "irradiation," an effect seen in the apparent size of the stars), is able to express several gradations, and consequently suggests detail; black, on the other hand, always comes forward, and can therefore only be used, as a rule, in the foreground.

The result of this is that we are, as a rule, obliged to model our shades by those in the middle distance, where the interest of a picture generally lies. To assist this, artists treat a picture as seen under a special tone of light, which gives a key to the effect. For instance, a moonlight scene would be characterised by a dark prevailing tone; whereas a bright sunlit view would be drawn in a light key, though in both the high-lights would really be equally brilliant.

A great deal might be written about this subject; but it would probably have very little practical value, because the student must learn the details for himself by observation and practice. In fact, it is a true maxim that anything worth learning always takes trouble and perseverance.

A photographic beginner, who is anxious to acquire a knowledge of values, ought, therefore, to go through a course of study like an artist's, only in his case it will not take nearly so long. That is to say, he ought to begin with still-life studies, such as a group made of a black bottle, a few oranges, or something similar, and a background, such as a cloth or coloured handkerchief; when he can do these sort of objects well he might advance to buildings with a few trees, and so on. The Claude mirror can be used in the place of a master, so that he may see how he advances. In this manner his work would probably acquire a solidity and truth it did not possess before, and he would obtain a true idea of values. And it must be always remembered that a true rendering of values in a picture will always make one which is deficient in it look poor, weak, and flat in comparison. In these studies it will be found that a normal developer will not answer, as it is by modifying the developer, and by an intelligent use of stops, that photographers have the most power in getting the values correct.

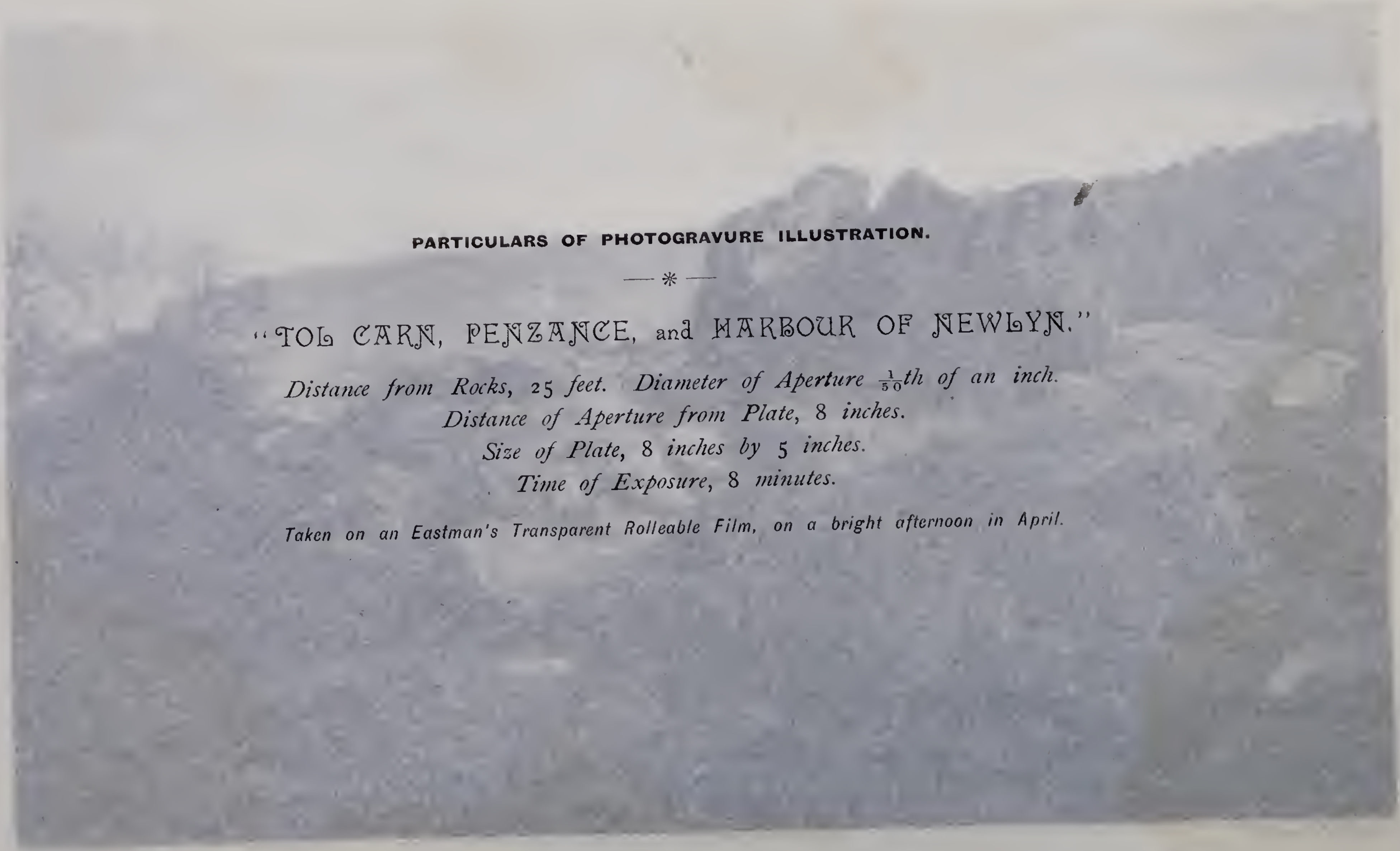
I know this course of study may seem needlessly severe, and for those who only aspire to topographical photography, I should say it is needless. For those, however, who aspire to make artistic photographs, I think it is the shortest road to that result. Mr. Jabez Hughes, in his work on photography, recommends a similar course to those who wish to take portraits; namely, a preliminary careful study, by means of taking photographs of a plaster bust, and says that the student should not advance to the living model until he has overcome all difficulties with a bust.

Photography will not, of course, overcome all difficulties, and dodging the negative in printing, retouching, and also combination printing must often be resorted to, in order to obtain a perfect result ; but still the negative ought, first, to be as perfect as it is within the nature of our materials to make it.

J. G. P. VEREKER.

fred Maskell. Inv^{t}

Walter L. Colls, Ph.Sc



PARTICULARS OF PHOTOGRAVURE ILLUSTRATION.

— * —

"TOL CARN, PENZANCE, and HARBOUR OF NEWLYN."

Distance from Rocks, 25 *feet. Diameter of Aperture* $\frac{1}{50}$*th of an inch.*
Distance of Aperture from Plate, 8 *inches.*
Size of Plate, 8 *inches by* 5 *inches.*
Time of Exposure, 8 *minutes.*

Taken on an Eastman's Transparent Rolleable Film, on a bright afternoon in April.

ARTISTIC FOCUS AND THE SUPPRESSION OF THE LENS.

I HAVE been led to bring before the readers of the Photographic Quarterly the subject which forms a title to this paper—first, because it is one of high interest to photographic art; and next, because I am persuaded that, notwithstanding the undoubted importance, it is one upon which very little is at present known by the public generally. It is surprising how few people are aware of the fact that a photographic picture can be made with the simplest form of *camera obscura;* that is to say, without the aid of any glass lens, and by means only of an aperture of very small dimensions through which the rays of light are allowed to fall upon and impress the sensitive plate. And this ignorance is not confined to those who do not themselves practise photography. Amongst the hundreds of thousands of amateur photographers, who at the present day more or less dabble in the art, the great majority have the vaguest notion of the possibility even of the process; few have any idea of the beautiful results which may be produced by this means; and fewer still have endeavoured to make a practical use of a branch of photography at once the most simple as regards appliances, and of very high value from the artistic standpoint. The object of this paper is, therefore, to endeavour to attract general interest to a subject which has of late been steadily making progress amongst a certain section of photographers—viz., the claims to artistic recognition of pictures which, instead of showing the intense definition characteristic of a photograph as generally understood, have, on the contrary, that definition, or sharpness of focus, more or less modified. A very prominent and, in the present condition of optical apparatus, in my opinion the best method of producing this result is that in which the lens is entirely suppressed, and a simple aperture of more or less minute diameter used in its stead. I do not, however, propose to confine myself to the consideration of this method alone, but as occasion arises to include in a general way also the consideration of diffused focus as applied to pictures produced by means of lenses and other methods used in conjunction with them.

It is incontestable that within the last few years the current of feeling in the artistic world of photography has been steadily inclined towards the production of pictures in diffused rather than in concentrated and minute focus. The subject has been discussed over and over again, scientifically and artistically, at the meetings of the most prominent photographic societies; and the columns of the photographic papers have teemed with an argumentative correspondence, the warmth of which on both sides has expressed the earnestness of the writers and the importance of the bone of contention. At the same time, many of the most important pictures at the various exhibitions are clearly of the new school, and the number of disciples steadily, if slowly, increases.

It is impossible to ignore, nay, on the contrary, it is reasonable to accept with the greatest deference the criticism of artists—painters, engravers, etchers, and others—who are not photographers. What, then, is their attitude towards photography of the old, sharp school, and towards that which differs so essentially from it? It is a fact that, to speak generally, an artist, or one of artistic tastes, abhors a photograph. He will, at the best, treat them with a certain amount of condescension; allow that they are pretty, clever, charming even; but art—never! It is not my purpose here to discuss whether any system of photography, even the system which I desire to advocate, can rightly claim to be included amongst the fine arts; but I will maintain that pictures of the character alluded to come as a revelation to the artistic critic who views them for the first time. Much more than their curiosity is aroused; they are surprised. A picture which, although a photograph, is without the distinctive and to them objectionable features of photography, gives rise to an expression of wonder that it has been produced by similar means. It is, in fact, the absence of those aggressive features, hitherto the cause of the antagonism raised in the artistic mind, which allows the picture to be treated with consideration, and a willingness to accept it as a work of art. One often, in fact, now hears such an expression as the following:—" Oh, I like that; that is quite artistic, not a bit like a photograph." In a minor way the same feelings were aroused when first the garish obtrusiveness of the highly-polished surfaces hitherto employed in the printing of photographs gave place to the softness and simplicity of matt surface or roughened papers. So, also, with the softer harmony, where minuteness of detail is not so prominent. It is as the mellowness of age to the crude brilliancy of new varnish; as the tone of ancient woodwork to the newly smoothed and polished carving; or, again, as the rough and bold inaccuracy of the work of the Eastern handicraftsman to the mechanical precision more characteristic of the West.

It is evident that the more we dispense with the mechanical in photography, the more we rely on the simplest methods of procedure, the more, in fact, we eliminate what is distinctly photographic, and assimilate our work to the characteristics of brush and pencil, so much the more likely are we to obtain that freedom and originality, that capability of expression and thought, which alone can raise the productions of photography to the level of a picture.

Very much remains to be said with regard to the higher artistic merit of photographs in diffused focus produced by the simple aperture, or by means of lenses applied in various ways with the same object; but the description of the first of these methods requires so much space that artistic considerations must give place for the present to the more practical side. Briefly, my desire is most strongly to bring forward one phase of what in photography is called artistic focussing, produced by the entire suppression of the lens, and the reduction of the means employed for the concentration of the rays of light on the sensitive plate to the most elementary form of the *camera obscura*. At the same time, it is with no spirit of undue depreciation of the great merits of other descriptions of photography. On the contrary, I fully recognise their great and many beauties. Neither have I any ambition dogmatically to assert my own opinion, or to hold that it is the only true and real method of photography. The question is one which is now exciting so much attention that a practical consensus of opinion will before long be arrived at, and in that expectation I am, for the present, content to leave it.

Sooner or later, in the experience of many earnest workers in art photography, the result of their labours executed in the ordinary manner, the mere record of places and sights they have seen, will cease to have any pleasure or charm for them. Rightly enough, in their early student days they will occupy themselves with mastering the mechanical *technique* to be acquired by the conventional use of lens and dry plate. They will even be keen partisans of fine definition of focus, and warm antagonists of a school to which they will be too delighted to apply what they mean to be a derisive epithet. They are young in art, inexperienced and untrained. But their practice, such as it is, of art leads them to study and inquiry, and the time will come for those who persevere when they will recognise the folly of believing themselves to be capable of being masters to themselves, intolerant of teaching, and impatient of authority. Something more than the mere map like representation of nature, which is the limit of the pure photograph, will reveal itself to them as a thing to be desired in art, if it be only photographic art. In their search for something capable of rendering thought and expression they will find the thorn in the path, the stumbling-block and difficulty, to be the unyielding hardness of the lens; and, failing success in the endeavour of opticians to render it more pliable for their purpose, the alternative, by its total suppression and the substitution of the simple aperture, will, by the results it gives, afford at least a partial satisfaction. That these results will long be *caviare* to the multitude is certain; but the taste for *caviare*, like every other acquired or cultivated taste, is one that grows the more it is indulged, and never palls. It is the same with all the arts, which are, indeed, but acquired or cultivated tastes. In poetry, in music, painting, sculpture, just as in matters which affect the palate only, the tinkling verse, the claptrap song, or the gaudy picture tickle easily at first the uneducated eye or ear, but their fascination fades as quickly; whereas that which requires training and reiterated practice to understand seems to be endless in its claims on the appreciation of the senses.

The space at my disposal does not, however, permit me to enter more at length into this view of my subject. I will, therefore, proceed at once to the more practical consideration of photography without a lens, or what has been known to some extent hitherto as *pinhole* photography. With regard to the latter term, besides its suspicion of vulgarity, it cannot be said to be quite accurate. The expression "about as large as a lump of chalk" is almost as definite; and, as I shall presently show, the aperture has by no means necessarily much relation to a pinhole, for it may vary from, say, $\frac{1}{100}$th of an inch in diameter to (under extreme circumstances) half an inch or more. Whether or no the suppression in a photograph of the distinctive features of photography, as commonly understood, be a matter for condemnation, or even ridicule, I am not concerned to inquire. It is certain that the result is to give increased pleasure to many minds; and it is to be remembered that it is still photography, although not lens photography. It is the lens and its imperfections which are suppressed.

I shall endeavour, in the treatment of my subject, to avoid as much as possible scientific details, and to use them, when obliged, in the plainest manner. From an optician's point of view the lens and its functions have been elsewhere exhaustively treated; from an artistic point, questions such as how quickly and in what manner the eye accommodates itself to several planes successively have been discussed *ad nauseam*, and, I think, also uselessly. They can be made to prove too much.

It is said to have been a favourite thesis amongst theologians to debate upon the number of angels which could assemble on the point of a needle. Doubtless they would have been struck with the idea that the images of the entire angelic choir could pass upon one ray of light through an aperture as fine as the point of the finest needle could puncture, and form a pictorial representation in natural colours on a screen on the opposite side of almost unlimited dimensions. Yet that is, reverently speaking, what the *camera obscura* is enabled to do; and it is a similar process which we apply to photography in picture making without a lens. As an example I venture to present an illustration, ably etched in photogravure, by Mr. Walter Colls. My regret is, that I have been unable to avail myself of far more artistic negatives by more skilled photographers. So far as I am aware it is, however, the first that has been published, and I must allow it to stand, as an example, at least, of the technical side of the subject.

Broadly speaking, the rays proceeding from an object and passing through a lens form an image in strict focus when received on a screen placed at a certain fixed distance only from the optical centre of the lens. It is not possible for quite near and distant objects to be at the same time absolutely clear, or in sharp focus as it is called. The less the focal distance the greater is the field embraced, but while a short focus lens possesses scientific advantages, the form of the lens tends to distortion; and violent perspective, which, although capable of correction to a certain extent, is always present. The angle included cannot easily, with a lens, be made to extend beyond an angle of about sixty degrees. The rays of light also, passing through a denser medium than the air, are refracted on their entrance and exit, and cause a distortion more appreciable at the edges of the lens than approaching and at the centre. To form an image a concentration of rays is required, and, by the laws of diffraction, this occurs also when a bundle or cone of rays comes across the edge of an orifice, such as the aperture which we substitute for the lens. As with the lens so with the simple aperture there are certain limits of position of the screen or sensitive medium, for which, with a given diameter of opening, the image is formed with the greatest degree of sharpness; in this case, however, much greater latitude is permissible without in any appreciable degree altering this sharpness. There being no change of density there is no deviation of the axis of each cone of rays on passing through the opening; the image, therefore, is formed with geometrical precision.

The simplest form of camera, and the only apparatus absolutely required is a light tight box, in the centre of one side of which the aperture is punctured. Facing this, on the opposite side of the interior of the box, is the arrangement for holding the sensitive plate or film required to be exposed. In order to economise space I shall now proceed to give practical details, as briefly as possible, of the best form of apparatus, and general axioms on the principles involved.

Apparatus.—An ordinary camera, made to extend to twelve inches (for the larger sizes of plates to twenty-four or thirty-six inches) with dark slides, glass plates, films or a roll holder. Or a film may be fastened with pins facing the aperture; there is no necessity that it should lie perfectly flat. A large hole in the front (which should be a sliding front) may be covered with black paper, and the aperture punctured with a fine needle; or the lenses may be removed from a lens-mount, and the apertures of different diameters adapted to the holes in a rotating diaphragm; or a slip of metal pierced with the necessary openings, may be made to pass in front of the centre of the larger aperture; or they may be pierced in the circumference of a circular plate of metal which is made to revolve as required. Other methods will easily suggest themselves, on which it is unnecessary to enlarge.

Diameters of the apertures.—The diameters of apertures vary according to their distance from the sensitive plate. The results of experiments show that for a distance of between three and five inches the most suitable opening is one of $\frac{1}{100}$th of an inch. Other convenient diameters are $\frac{1}{70}$, $\frac{1}{50}$, $\frac{1}{40}$, $\frac{1}{30}$, $\frac{1}{25}$ and $\frac{1}{20}$th of an inch. The metal plate should be about $\frac{1}{100}$th in. in thickness, the hole pierced a wide cone shape and without any blur at the edges.

Focussing and view-finding.—The question of focus naturally does not enter into our practice; it is absolute and fixed. It is necessary, however, to know what extent of field will be included on the sensitive plate. There are several practical methods of doing this. Amongst them are the following:—An aperture of $\frac{1}{20}$th of an inch will give a sufficiently distinct image, in a bright light, on the ground glass screen. Or, it may be taken that a simple aperture at a certain distance from the plate, will include the same angle and give the same field of view as a lens of the same focal distance with the same size of plate. Or ordinary finders adapted to the different focal lengths may be used. Or, again, the camera being swung round, and the eye applied close to the aperture, the field of view will be included within the limits occupied by the (previously removed) ground glass screen. There are other methods to which, however, it is scarcely necessary to devote space.

Exposure.—The question of the length of exposure required to be given is, of course, important. At the same time, so many factors enter into the consideration that it would not be possible fully to discuss it here. The experience of the operator and a few trials will prove of equally good service. As a guide, it may be said that the exposure required naturally increases according to the size of the plate and the distance from the aperture. The intensity of light is in inverse proportion to the square of the distance. George Davison, in a communication on the subject to *Photography*, says, that "the relation between the squares of the diameter of the pinhole to that of a lens of given focus gives inversely the relative exposure. Thus, with a $\frac{1}{4}$-plate camera with a 6-inch focus lens and a stop $\frac{1}{4}$-inch diameter, and a pinhole $\frac{1}{60}$th inch with same focal length, the amount of light let through will be as $\frac{1}{16}$ to $\frac{1}{3600}$, or as 225 to 1; that is 200 or 300 times as much exposure would be required." Much also depends on the method of development, and in regard to this the same precautions and methods of manipulation with respect, for instance, to contrasts, require to be taken. The exposure of the negative from which the illustration was taken is given on the fly-leaf with the other details.

Remarks on general principles.—It is best to use a narrow angle; 8 to 10 in. for $\frac{1}{4}$-plate, 12 to 15 in. for $\frac{1}{2}$-plate, and so on. There is practically equal definition in any plane, whatever the length from plate to pinhole. With a short focus images overlap more, and are less clear than with a longer one (*Davison*).

The angle included may equal, and even exceed, 100°. It is however, advisable to take an angle of 90° as the maximum with which good results are obtained, and for pictures the angle should not exceed 45°. Movement of trees and vegetation, if not too great, is not materially important. Objects, however, in movement which do not return to the same positions will not be imaged; for instance, the interior of an exhibition in which crowds are moving about would show the building empty of people, with its stalls and exhibits only.

The depth of focus is unlimited. Spherical or chromatic aberration, distortion or curvature, astigmatism, and other disabilities of the lens are absent. Images are formed with absolute precision, and in mathematically true perspective. There is with each distance of aperture from plate a definite size of opening with which the maximum of sharpness is produced, beyond which, either smaller or larger, it falls off. The size of objects is proportionate to their distance from the aperture, and the distance of the aperture from the plate. The following proportion may be established:—The distance of the object : the size of the object :: the focal distance : x (size of image). Conversely to find the actual size of any object imaged on the plate—The focal distance : the distance of the object :: the size of the image : x (natural height or size of object). I give here a table containing practical details, which may be found of value as a guide in working. Bromide papers may be used in the production of the negative, the exposure being increased, say ten times that required for a 60-times plate.

Size of Plate.*	Diameter of Aperture.	Distance of Plate from Aperture.	Exposure.
Quarter Plate.	$\frac{1}{40}$th of an inch.	9 inches.	See previous remarks under this head. It may be added that the intensity of light being in inverse proportion to the square of the distance will regulate the exposure for different focal lengths, and the amount of light transmitted being proportional to the square of the diameter of the aperture, will regulate the exposure required in this respect.
Half Plate.	$\frac{1}{40}$,,	13 ,,	
Whole Plate.	$\frac{1}{30}$,,	16 ,,	
10 × 8.	$\frac{1}{25}$,,	20 ,,	
15 × 12.	$\frac{1}{25}$,,	30 ,,	
Over the above sizes.	$\frac{1}{20}$,,	36 ,,	

For copying engravings or pictures.	—	—	Distance of object to be copied.	In ordinary good studio light.
Copying same size.	$\frac{1}{70}$th of an inch.	18 inches.	18 inches.	15 minutes.
,, $\frac{1}{2}$,,	,,	12 ,,	24 ,,	7 ,,
,, $\frac{1}{3}$,,	,,	10 ,,	30 ,,	
,, $\frac{1}{4}$,,	,,	10 ,,	40 ,,	
,, Twice the size.	,,	24 ,,	12 ,,	30 ,, The above applies to black and white engravings. For paintings, double at least.

Other means to produce effects similar to those of the simple aperture have been suggested, and are still being tried. Amongst them are the use of a diffraction grating in the place of a stop, printing from the wrong side of a negative, with a ground glass or film interposed, or on very rough paper, or by using a very large aperture or stop. A very excellent method is the racking out of the lens from its position of fine focus, in conjunction with a small stop, say *f*/64, or smaller. With this, exposure is not inconveniently prolonged.

The subject of photography without a lens appears to have attracted more general attention abroad than here. In France

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* The figures given above are intended to apply to artistic work only. The camera with simple aperture is, however, of service also in other ways; for instance, in topographical surveys, where in conjunction with the instrument known as a cylindrograph it is of especial value. Smaller apertures and wider angles may therefore require to be used.

M. Colson, Captain of Engineers, has written an exhaustive monograph on the subject; and I have to express my indebtedness to him for much information. Captain Abney goes very fully into the theories involved in the June number (1890) of the proceedings of the Camera Club. He says that "artist painters cannot as a rule make anything sharp; but if we look at pictures like Alma Tadema's we are bound to confess that there is a sharpness about them which nearly rivals a photograph. He puts nothing out of focus." Without discussing the question whether artists can or cannot paint microscopically sharp, it may be conceded that there have been great painters whose minuteness of detail exceeds the typical one cited. Still, it is open to question whether the microscopic sharpness characteristic of a photograph has ever been given in painting. Certainly it would be difficult to point to examples by great masters in pure landscape, or of buildings other than architectural plans. Even Canaletto cannot be instanced as a case to the point. Let us not forget, also, that a photograph does not necessarily imply a work of small dimensions. What might be appropriate to De Blaramberg's minute execution on snuff-boxes, for instance, does not apply to large canvases. It must not be lost sight of, either, that the very material upon which pictures are made is against harsh minuteness of detail. No amount of varnishing would produce the effect of an image kept entirely on the surface of albumenised or highly glazed paper. Consider, too, the case of the exquisite paintings on Sèvres porcelain, which owe much of their charm to the soft diffusion of the images in the porous body of the china, protected afterwards by the glaze, but differing from the harshness of those executed over the glaze itself. Captain Abney holds that it is waste of time to use a pinhole, when the same effects can be produced by putting a lens out of focus, or using one uncorrected for spherical aberration. So far, at least, I am not satisfied that such is quite the case. Undoubtedly what we require, as Davison has said, is a lens with which spherical aberration can be regulated at will. Failing this, the simple aperture which gives uniform definition throughout the picture is a compromise which is far from being unsatisfactory.

A great drawback, in the opinion of many, is the length of time required for exposure; but, after all, in many cases, this may be reduced to seconds. Again, the restless hurry of the present age, the ceaseless struggle to save time, is not in art a question worthy of consideration. To me there is much more charm in the evident deliberation. Supposing the aim of the artist be to produce pictures on a large scale, say fifteen-twelve or twenty-fifteen. He does not sally forth prepared to take whatever may turn up. On the contrary, he carefully and with deliberate thought chooses his subjects long beforehand; he has time to study effects of atmosphere, of skies and clouds; he thinks out all details, as a true artist should; and if, after all, he does not always succeed in interpreting to his entire satisfaction what his imagination has pictured, surely the time has not been altogether wasted.

The natural phenomenon of a picture formed in a dark chamber by the rays of sunlight has probably occurred accidentally in many people's experience. A chink or tiny hole in the shutters of an otherwise dark room and a whitewashed wall are the only requisites. It can scarcely, then, be doubted that, long before the *camera obscura* was named and described—far back in the days of old Egypt, perhaps—the occurrence was known, and purposely made use of, possibly, in ancient mysteries and incantations. It is scarcely credible, in fact, that it should have escaped notice. Yet we seem to have no certain description of the *camera obscura* before the middle of the sixteenth century, if we accept as apocryphal the attribution of the discovery in the thirteenth century to the English monk, Roger Bacon. Though somewhat vague, the references in a commentary on Vitruvius, published by Cesarino at Como in 1521, undoubtedly refer to it; and there appears also to be some mention of an instrument of the kind in the unpublished MSS. of Leonardo da Vinci, in which he ascribes the discovery to a Benedictine, Dom Panuce. Erasmus Rheinhold, too, is said to have used the *camera obscura* in 1540, during his observations of an eclipse of the sun. The Neapolitan, Giovanni Baptista Porta, however, is generally credited with the invention; and if not the first discoverer (indeed, as I have previously remarked, this is hardly likely), he at least describes it more minutely and practically in his "Magia Naturalis," wherein he says that, "having closed all the shutters of a room, a hole about as big as the little finger is made in one of them, opposite which is a white wall or stretched white paper. In this manner the representation of everything passing in the street, due to the rays of light passing through the hole, and the people passing up and down, is produced by an inverted image." Porta also applied the use of lenses and concave mirrors to the *camera obscura;* and Canaletto took advantage of this instrument in the production of his pictures. As an exhibition, a well-known instance has existed for many years on the downs at Clifton, in a small, observatory-like building, which, from its commanding position, gives many beautiful pictures of the surrounding country.

The application of the simple *camera obscura* to photography naturally excited the attention of the early workers in this art; but the sensitive mediums then known were too slow to lead to practical results. The use of such a camera without a lens can hardly be said to date back many years, although Professor Eder, in the *Photographische Correspondenz,* names Berry, in 1855, as having produced a landscape with a simple aperture of $\frac{1}{40}$th inch. Lord Rayleigh, in the *Philosophical Magazine* for 1880, contributes an article on the subject; and a most interesting note by the same authority will be found in the *Photographic News* of September 20th, 1889. I regret that space will not permit me to quote the whole of it. He deduces, however, I may say, that with an aperture equal to that of the pupil of the eye, and a focal distance of 66 feet, the image formed without a lens would be at least as well defined as that retained on the retina. Finally, Captain Abney's name is, of course, prominent as an observer, and as probably the first who used a lensless camera in the studio and in the field. Those who know the admirable work in other methods of George Davison, and that he is a strong upholder of the artistic merits of the "pin-hole," will not be surprised that he has produced equally admirable pictures, some on a very large scale, by this means. An exhibition of such, and similar, work would prove, I think, of high interest, and is very desirable.

My paper has spun itself out to, perhaps, an unreasonable length; but there still remains much to be said, which must for the present be deferred. By abandoning, as we undoubtedly do in the processes I have indicated, whether with or without a lens, the distinctive features of photography as generally understood, we do so with the intention of assimilating the art more closely to those methods of pictorial representation which we feel to be truest and best. It is because I am deeply impressed with the conviction that one side of photography at least is capable, if freed from fetters, of emulating the best examples of art in monochrome, that I have ventured to press the claims of a method of working for which a distinctive name is certainly required, and which, for the want of a better at present, I am obliged to characterise as Lens-less Photography. I have already said that I do not contend that it is the only one worthy of consideration; neither do I say that it is perfect or without drawbacks. To attain our end we are justified in using any description of focussing—any means which racking in or out, special lenses, and lenses stopped down or opened out, can give us. But the great desideratum is a perfect and pliable lens, and until that has been achieved I, for one, am content to rest satisfied with its total suppression.

Alfred Maskell.

AN IDLE TOUR THROUGH NORMANDY.

OF all the most enjoyable places within reach of this workaday world of ours, commend me to Normandy. I do not mean the Normandy of the guide-book tourist—fashionable, railway Normandy—but, rather, the quiet little inland villages where a tourist of any nationality, a photographer especially, is a *rara avis;* where the people are as guileless as they are primitive, looking upon the arrival of a stranger as an honour to the locality, and his departure as a national calamity. There are many such places in beautiful Normandy, and for photographic purposes they are teeming with interest. Wherever you go, the curious costumes, the rough, sunburnt visages of the peasants, the glorious cathedrals and picturesque houses, the cornfields planted with fruit trees, the roads that traverse them innocent of hedges, the lazy groups of horses and oxen, busy workers cutting, sheafing, carrying the golden grain—are all unconsciously engaged in picture-making, and making you exclaim, "This is Normandy!"

The only drawback that strikes one from a photographer's point of view is serious. Although every little town or village has at least one beautiful church or cathedral, it is usually so hemmed in by neighbouring houses that photography is next to impossible. Take Rouen Cathedral, for instance. Considered by Ruskin as the most exquisite work of flamboyant architecture in existence, it has a tolerably large and open space in front of it; but what is it in comparison with its majestic height? With a very wide-angled lens one scarcely dare hope to get in his picture more than the west front from any point of vantage. As it is with Rouen, so it is with Caudebec, and in a greater or less degree with most of the other churches and cathedrals in this part in France; and one cannot help feeling that the beauties of ecclesiastical architecture are compelled to hide their light under a bushel, from the too close proximity of crowding masses of houses.

Allowing for disappointments of this nature, there is everything else in the country to compensate the photographer. At the outset one is naturally anxious about the Customs—whether there is any danger of plate-boxes being opened by too curious officials; but on the Newhaven and Dieppe route the authorities are most considerate, and will readily accept the photographer's assurance that he has "nothing to declare," and only bears with him the badge of all his tribe in the shape of a camera and tripod. Then, again, there never should be any difficulty as to a dark room; most of the country inns have those fine, old-fashioned bedrooms astonishing to English travellers. They are usually very large, paved with stone or tiles, and are peculiarly adapted to the photographer's needs, in that the bed is generally placed in the corner of the room farthest away from the window; a canopy over it is hung with heavy damask curtains, which one can draw completely round the bed, and fasten with a pin from the inside. There is, too, always a softly cushioned coverlet extending over half the bed, which, although too warm to sleep under with comfort in summer, will serve as a receptacle for plates whilst changing. With the light of a cigar or the touch of a finger one can change plates with comparative ease and perfect safety,—a thoroughly luxurious dark room.

Let me give the outlines of a tour, embracing as it does most of the salient points, which should occupy from a fortnight to three weeks. Of course one can hardly expect to see the whole of Normandy in this time; for one may find plenty to do, and much enjoyment in doing it lazily, in a much longer period.

Dieppe is the best starting-point geographically, economically; and the first stopping-place should be Rouen. Its streets of fine old houses, rapidly disappearing; its fish market, full of life; its beautiful churches and cathedral; the groups of fishwives and vendors of comestibles of all kinds, who arrange themselves most pleasantly, and exhibit a decided preference for being photographed to being left out of the picture. There is the Grosse Horloge, the Hôtel Bourgthèroude, the magnificent churches of St. Ouen and St. Maclou, to say nothing of the rows of tumbledown old houses which are always presenting themselves unexpectedly at odd corners.

Some one has said that a photographer with one lens is like a man with one eye. It is certainly the case in Rouen. To judge from the pictures one sees in the shop-windows, one would think that the photographic art had not reached that state of perfection here that one is accustomed to in England. You may see the cathedral denuded of its spire, its western front cut off halfway, and, worst of all, many pictorial representations taken with a lens too small, and exhibiting at the corners semicircles of black despair. A photographer must be a phenomenon in the streets of Rouen; and it is as well, with an imperfect knowledge of the French language, to commit to memory phrases that will induce the *gamins* to distribute themselves over a larger area, and keep away from the legs of your camera. Perhaps it is that they reserve their delicate attentions for the foreigner.

From Rouen Caudebec may be reached by road, rail, or river; but, as I said before, its beautiful church, another specimen of florid Gothic, is surrounded by very curious houses fantastically and picturesquely jumbled together. A stream runs through the town; now disappearing underneath the wooden houses; here spanned by miniature bridges; there turning the mill-wheel; and always serving as a washing-tub for the groups of *laveuses* kneeling in rows on long wooden platforms built out over the water. This is common throughout Normandy. Wherever there is a stream close to a town or village, there are the washerwomen making, whether they intend it or not, good figure subjects for the wandering photographer.

This branch of the railway goes no farther than Caudebec, and although it necessitates a special journey from Rouen, I think I would rather leave any other town in Normandy unvisited. I happened to be there on the day of the *Mascaret*, a great tidal-wave like our Severn bore, which ascends the Seine at certain seasons of the year, carrying all before it until its force is broken by the many windings of the river. Caudebec is the best point from which to see it, and the town was in holiday attire for the occasion. As another attraction, there was a fête of *pompiers*, and the firemen of all the neighbouring towns and villages were here assembled. From a photographic point of view this was to be regretted. Not only were the streets full of people, but flags and banners of every colour, every nationality, were suspended from house to house. The very paving-stones were pulled up at regular intervals, and fir-trees, hung with Chinese lanterns, temporarily planted in their place. They do these things thoroughly in France; but the mural and extra-mural decorations are more appreciated by the inhabitants than by the photographer in search of the picturesque.

From Rouen one can get by rail to Lisieux, a fine old town—more modern, perhaps, in appearance than Caudebec; but full of the same delightful, rickety old houses, the same streams and washerwomen. Here, for instance, is a typical view from one of the many bridges. The curious gabled houses—in which wood, brick, and tiles are jumbled together in a heterogeneous mass—are saluting each other with nodding heads from opposite sides; jutting out from bedroom windows or holes in the wall are long poles—extending, as it were, the right hand of fellowship across the stream—which serve for the prosaic process of clothes-drying, but at present are unoccupied. The eye wanders downwards from the broken line of roofs and fantastic penthouses, gables and mullioned windows, to the lichen-covered walls; and, lower still, to the quickly flowing river, bearing on its bosom the washing-boards of centuries, and hurrying on from one mill to another to fulfil its busy round.

Lisieux has a handsome church, once a cathedral, and it is one of the very few that can be photographed with comfort. Falaise is within easy distance, and, as the birthplace of a man who played such an important part in the making of English history, it should certainly be visited. The castle is distinctly disappointing. It has been restored and restored until it is difficult to discover anything ancient about it. Even now workmen are engaged in replacing the interior stone by stone, bit by bit. As a ruin it is a failure, and cannot compare with Conway, Carnarvon, Pevensey, or a host of others here in England. From the ramparts one gets many glimpses of beautiful country, and at the foot of the frowning rocks on which the castle is built runs the little river Ante. One can almost fancy that Arlette, the tanner's daughter, is still down

Old Houses at Lisieux.

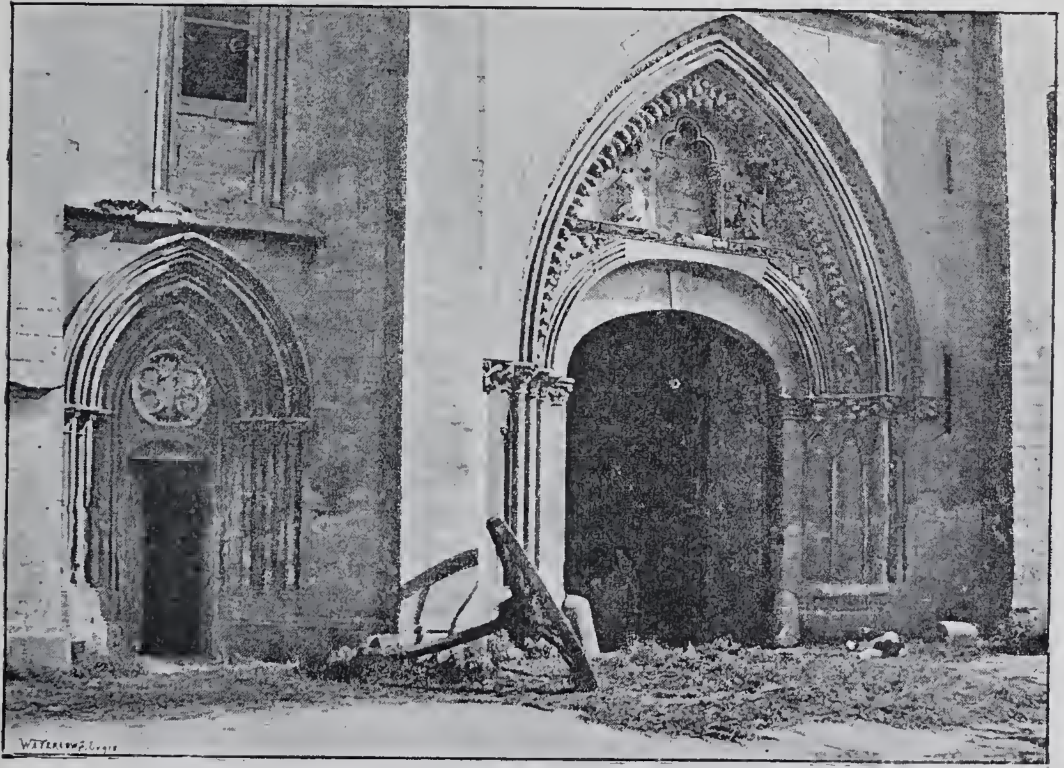
there washing clothes; certainly there is some one, and her name may be Arlette as well as any other. The *concierge* shows you the room in which the Conqueror was born—a little room in one of the massive towers; points out the dreaded *donjons* and *oubliettes*—a fearfully suggestive name—and, to impress you with the depth of the well, twists a piece of paper round a stone, and drops it lighted with a match. It goes slowly, whirling round and round, lighting up the sides of the well in its downward flight, until you can hear its dull thud as it reaches the bottom.

At the foot of the castle there is on the insignificant stream a picture it is worth many miles of travel to see. The water tumbles down to turn the tanner's wheel, and bounding from that it hurries to turn his neighbour's; from one to another it leaps, until there are no fewer than four or five mill-wheels within a score or so of yards. Taken with the little wooden bridge across it, its wealth of fern and lichen, this stream would strike an artist as more picturesque than the castle itself.

From Falaise to Caen, a city of modern houses and majestic churches, but with still some traces of the old world remaining to be discovered after careful search. Better than anything inside the town is the ruined Abbaye d'Ardennes, some two miles out on the Bayeux road. It lies a little off the highway, and is reached by a cross road through the cornfields. Its glory is departed. The conventual buildings are turned into a farmhouse, the refectory into a modern Norman kitchen, and nothing would serve the magnificent church but to use it for a barn.

No protest is lodged at your wandering at will over the place, unless it comes from the dogs. The gloomy aisles are full of straw, the arches choked up with trusses of hay, a rat scurries away at your approach, startled by the unwonted apparition, and a broken cart stands in the doorway to mark the desolation of the once beautiful Abbaye d'Ardennes. You ascend the crumbling stone staircase, traverse the silent galleries, and reach the vast roof. But even while you are enjoying the extended panorama of prosperous Caen, here opened out before you, you are thinking, "Oh, the pity of it! Could such desecration be possible in any other land?"

Viewed from the outside the proportions of the church strike one as being very fine, and the beautiful rose window in the west front as the perfection of delicate tracery. Surely we can still learn something in the matter of church architecture.



Abbaye d'Ardennes.

Caen to Bayeux, with its tapestry and its cathedral. One can get up some amount of genuine enthusiasm about the latter, modern though it be in outward appearance; but there is no point, as far as I could make out, from which it could be photographed. There are, however, many quaint streets of timbered houses, with the cathedral spires as a background, and many quiet nooks worth the expenditure of a plate.

From Bayeux to St. Lo, and then on to Coutances, if one travels by road, there are many pictures to be found. Miles of forest; here and there the hut of a woodcutter or charcoal-burner; teams of horses, with their jingling bells, engaged in drawing huge loads of timber; new birds, new flowers, new costumes—everything is new to a stranger in a strange land.

Coutances has a cathedral, too, and has sufficient space in front of its western extremity for the purpose of photography. There are many English here, especially of the clerical persuasion. How strange it is that they should congregate in certain towns such as Avranches, Mont St. Michel, St. Malo, and Dinan; while Dol knows them not, neither are they seen at Vitré. One can understand the selection of Mont St. Michel; it is the sight of Normandy, and justly so. Half-fortress, half-monastery, it is no longer an island, but connected with the mainland by a long semicircular road. A small town has ensconced itself at the foot of the massive rocks, but most of the poetry of the place is destroyed by its eminently business-like inhabitants. They descried us coming from afar, and when we were at least a mile away sent special messengers to recommend the rival hotels, Poulard Ainé and Poulard Jeune. Rid of these, we made our way to the gateway, and were at once surrounded. It was in vain protesting that there was no intention of sojourn at Mont St. Michel; we were unprotected travellers, and came merely to see the monastery, and photograph it if possible. Such protestations were useless; we were robbed of bag and baggage by main force, and it was with the utmost difficulty I obtained the loan of my apparatus for professional purposes! What a beautiful place it is; what groups of sturdy, brown-faced fishermen; what store of wonder in the winding flights of steps! One could spend many days at Mont St. Michel.

Back to Pontorson, and thence to Dol de Bretagne, usually known as Dol. This is a curious old town, with its one main street—a fine, broad thoroughfare—and still another cathedral. The houses strike you at once as being different to anything you have seen in Normandy, and so do the people. Our arrival created quite a stir in this remnant of the old world; the whole population came out to see three English tourists in cycling costume, one with a camera. Such a combination had never been known before, and provoked comment.

From Dol—gentle, sleepy, primitive Dol—we had some charming country to Fougères, Ernée, and Mayenne, and then on to Alençon, where there is a beautiful church—Notre Dame. There is no outward evidence of lacemaking in the town itself; most of it seems to be made in the neighbouring villages, and very little exhibited in Alençon.

A Street in Old Rouen.

From here it is no great distance to Sées, with a cathedral of the usual style—two towers at the west front, and one in the centre of the nave. Sées to Gace, Broglie, Bernay, Brionne; and we were rapidly approaching Rouen from its southern side. Following for many miles the winding Seine, with its wooded hills and innumerable islets, we could see far away in the distance the smoke of busy Rouen; and then we knew that the pleasantest of holidays was at an end.

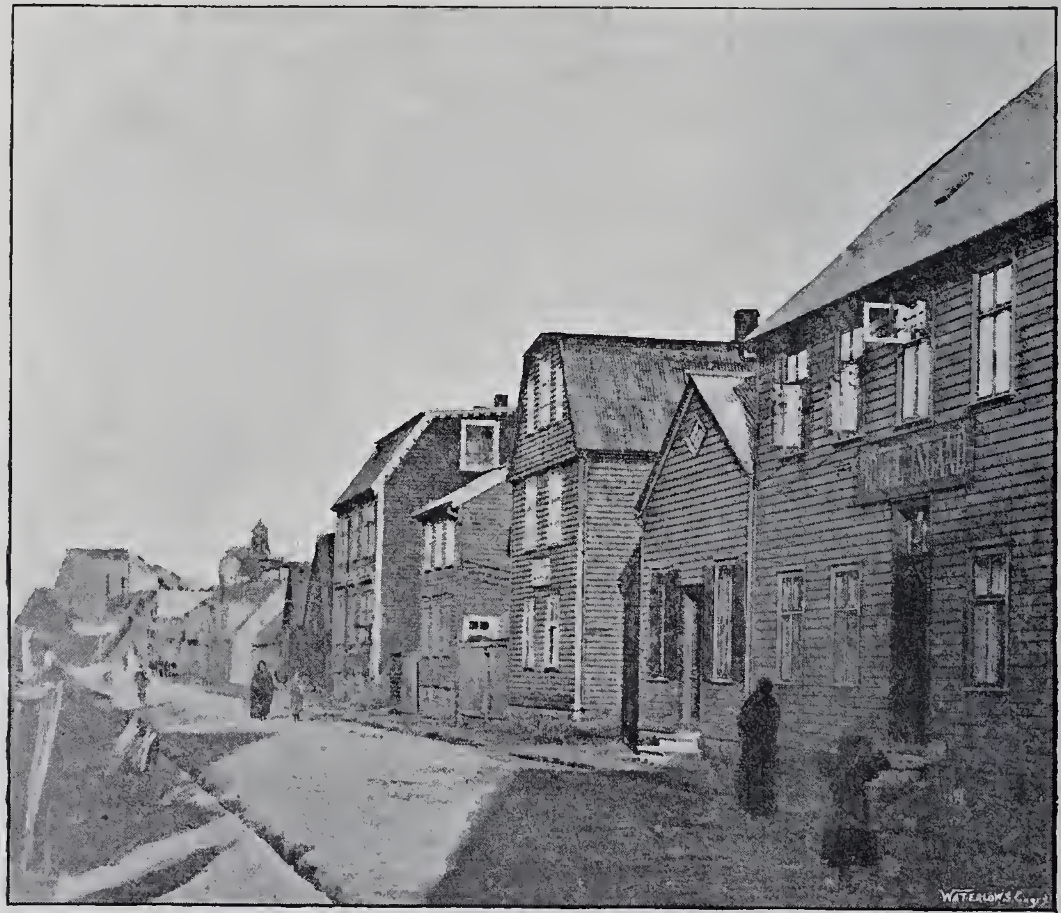
A word or two, in conclusion. Outside the orthodox show-places and the usual resort of the English tourist—who, by the way, seems to have a fatal facility for raising tariffs—hotel living is as cheap as it is good. There are one or two little peculiarities in the matter of food and feeding one soon gets accustomed to, and one or two, such as washing accommodation and general sanitary arrangements, insular prejudice will never let us conquer; but, taken altogether, there is no more delightful country for the photographer. The people are as warm-hearted and obliging as one could meet anywhere, and nothing is a trouble to them. Ever willing to put themselves out of the way to do you a service, they are masters of that politeness which springs from a good heart. Mine host welcomes you on arrival, and he and his following will insist on seeing the last of you, from the middle of the road or whatever coign of vantage presents itself and your retreating figure longest to his view. We were only flying visitors, after all; but they treated us as old friends.

The pleasure you can give by photographing a baby here and there will repay you by ten times the amount of trouble it entails; and if you keep the promise you made to the mother, and send her a copy, her gratitude knows no bounds, and you have the satisfaction of knowing that you have driven another nail into the coffin of an evil reputation—or, shall we say a reputation for selfishness which has been the attribute of an Englishman in a foreign country for many generations?

BERNARD ALFIERI.

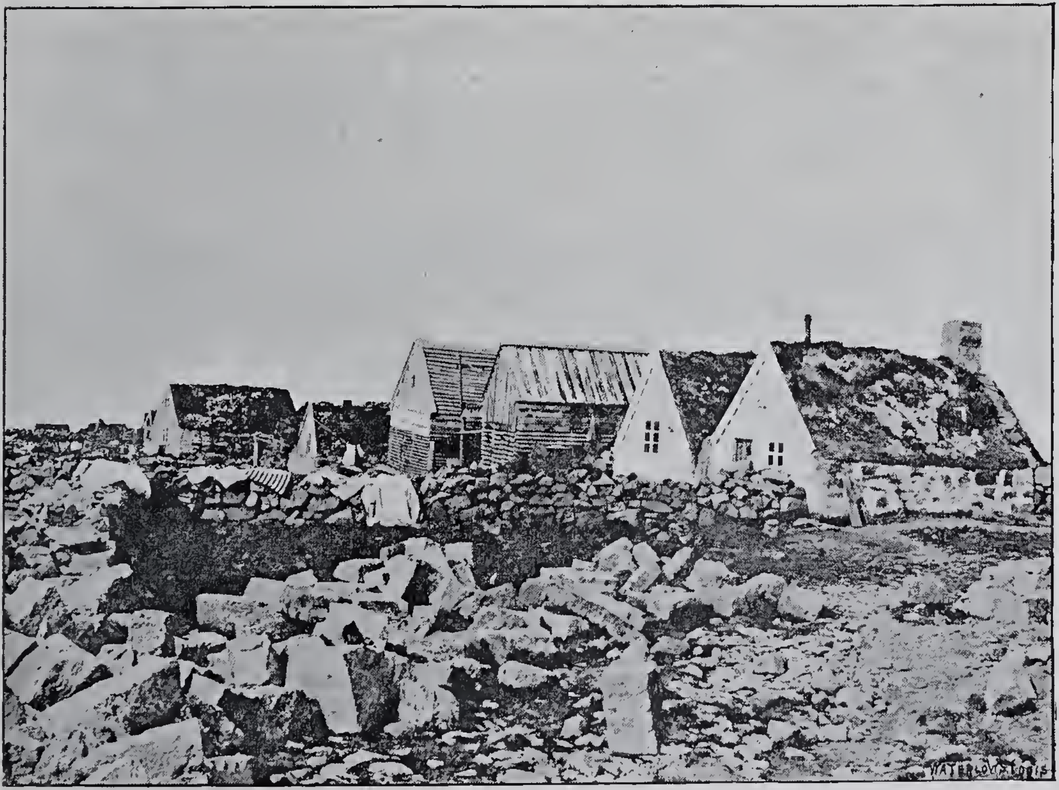
A SHORT ACCOUNT OF A TRIP TO ICELAND.

HAVING long had a desire to visit this extremely interesting island I determined this summer to make the attempt, and, if possible, to bring back a few photographic records of what I might see. Accordingly, I looked around among my acquaintances for a suitable companion, but all eventually declined, chiefly as I afterwards discovered, because they thought they would have to "rough it," and live on black bread and tallow, and other such delicacies; so, as time was pressing, I decided to enquire whether the Editor of the *Amateur Photographer* knew of anyone who was about to make such a trip as I contemplated, and he most kindly introduced me to Mr. Paul Lange, of Liverpool, who had managed to get together a party of eight gentlemen, all of whom were bound for Iceland; and after a few disappointments as to the place and time of starting we all eventually found ourselves at Leith. At ten o'clock on the morning of June 30th we went on board the *S.S. Magnetic*, one of Messrs. Slimon's boats; and at twelve o'clock midday we started for Iceland in the midst of a drizzling rain. We all felt and looked very uncomfortable, as the weather was depressing to the last degree. The course lay along the east coast of Scotland, until we reached the Pentland Firth, through which we passed; having the mainland on our left and the Orkney Islands on our right hand; and when the weather cleared sufficiently for us to see the coast-line the scenery was very fine. From this point we saw no land for three days, until we sighted the coast of Iceland; and shortly afterwards the Westmann Islands, which are due south, appeared, and as the day wore on and we approached more nearly the mainland, the Myrdalsjokul came into view, showing clearly the glacier on its summit, looking grand through the clear atmosphere, being bathed in brilliant sunshine; for the weather had now cleared up and was beautifully fine. Of course, at this time of year, night completely disappears in high latitudes, and the sun merely dips below the horizon for an hour and then rises again, it being brilliant daylight in the meanwhile.



Chief Street (Asturtrœti), in Reykjavik, showing our Headquarters, the "Hotel Island."

Early on the morning of Friday, July 4th, we anchored in the harbour of Reykjavik, much to the delight of some of our party, for we were not *all* good sailors—in fact, one or two passed nearly the whole four days' passage in their berths. We had had, however, a very fair voyage; and so far as our captain was personally concerned he did all in his power to oblige us, especially when passing any point of interest, for he ordered the engineer to go dead slow, to enable those who had cameras to take a photographic shot as we passed. At 10 o'clock, a.m., we packed up our things and rowed to the landing-stage in one of the ship's boats, and went at once to the "Hotel Island"—a neat, clean structure built of corrugated iron, and situated in the main street (Asturtrœti). The proprietor, Mr. Halberg, was very obliging, and did all he could to make us comfortable. We had good beds, and everything was scrupulously clean: in fact, intending visitors cannot do better than to make this hotel their headquarters while in Reykjavik. About twelve o'clock midday we had our first Icelandic meal (breakfast), consisting of *raw* salted herrings dressed with rings of *raw* onions, *raw* sliced salmon (called *lax*), anchovies, rolled mutton, *raw* ham, hard-boiled eggs cut into quarters, lobsters, and boiled beef; black, also white, bread, and

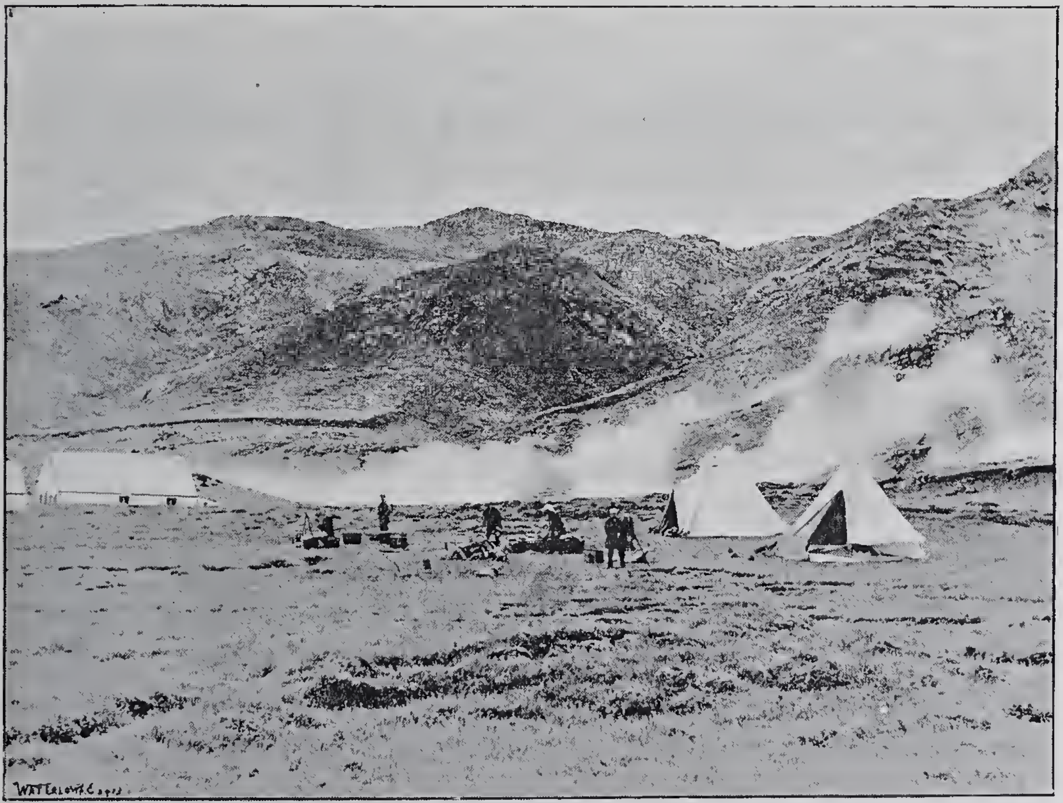


Old Icelandic Houses with Lava Walls and Turf growing over Roof in a Side Street in Reykjavik.

very good Danish butter; excellent coffee and cream and *schnapps*. Well, we could put up with this fare, although it was a slight shock to some of us to find so many *raw* articles of diet! The meals, of which we had two daily (breakfast at eleven and dinner at seven), were pretty much alike during our stay in Reykjavik, so that they will not again be referred to. After breakfast we went out for a stroll to have a look at the town and its inhabitants. As for the town it appears to consist of two or three long straggling streets running parallel with the shore. These streets are connected by two other streets, one at either end of the town running inland, and at right angles to the former. The houses are most irregularly built, of boards tarred over, or of corrugated iron; but in some of the older parts of the town there are some of the real old Icelandic *boes*, constructed of lava blocks and thick slabs of peat laid alternately and firmly together to the height of about five feet, and to the thickness of four feet—this great thickness being necessary to keep out the intense cold during the long Arctic winter. Resting on these thick walls is a light timber roof, and all over the outside of the walls and over the timber roof are planted thick slabs of turf; this mode of covering dwellings, although picturesque, makes it very difficult at short distances to distinguish the houses from the uneven ground when travelling across country, especially where there is any grass around.

Shipping Ponies from the Landing-stage at Reykjavik.

The illustration of some houses in a side street of the old part of Reykjavik, with space of grass enclosed with large blocks of lava, will serve to show what is meant. The chief exports from this town are ponies, eiderdown, sheep, and dried fish. In many places large areas of ground are covered with fish, chiefly halibut, split open and laid to dry in the sun, and it is said by some who have visited these spots that the odours far exceed in foulness the combined smells of Cologne; but although I went all over the town there was an entire absence, so far as I could detect, of any disagreeable emanation from the fish. The lower class Icelanders are very dirty, and if there are two things which they avoid more carefully than anything else, they are cold water and fresh air; and when we were travelling inland, and had our delightful morning sponge, down in a lovely cool stream or clear placid lake, they occasionally looked on with a facial expression



Our Camp beside the Sulphur Pits and Boiling Mud Cauldrons.

which clearly said, "These men must be lunatics." Of course these remarks do not apply to the educated and better class people. The chief places of interest in the capital are: The Cathedral, a very plain building, plastered outside and washed over with pale orange colour; the Althing House, a plain but substantial building; the Square, consisting of a very rough piece of turf with a statue of Bertel Thorwaldsen in the centre, protected by a wooden post and rail fence; and the Governor's House, a long, low, whitewashed building with a large square garden in front of it, and the Danish flag flying from a flagstaff placed in the centre. Having thus taken a general look at the town we all met at dinner about eight o'clock, and as several prominent Icelanders were present as our guests, who could speak English *well*, a very lively and general conversation was kept up, which ended by our Icelandic friends bidding us a hearty welcome to their shores, and drinking toasts to the success of our expedition. After dinner Mr. Paul Lange and I rode out of the town some five or six miles to see some boiling springs which my friend had a great desire to photograph; and as some Icelandic washerwomen were busy at their usual occupation he ought to have some very pretty views. We returned from the springs after a very pleasant ride in a brilliant sunlight at 11.30 p.m., and on arriving at the hotel we went at once to bed. The rest of our party also went to see some hot springs, but in a different direction. The next day, Saturday, July 5th, we were up at 7.30 a.m., and having repacked all *necessary* articles in pack-boxes ready for the ponies, we had some coffee and cakes, and went out for a couple of hours—partly to give us an appetite and partly to get some good photographs.

On our return, and after breakfast, it was decided that we should start early the next morning (Sunday) for Krisuvik, as this was to be the first place visited after leaving the capital. Our route, which was carefully sketched out by our head guide, Thorgrimur Gudmundsen, was as follows: From Reykjavik through Hafnarfjordr to Krisuvik, 25 miles; thence to Vogsosar, 20 miles;

from there to Eyrarbakki, 25 miles; then on to Sandholaferja, 17 miles; from there to Hekla, 33 miles. At this latter place we were to stay one clear day, to allow those who wished, to make the ascent to the top of this celebrated volcano. From there we were to proceed to Hruni, 19 miles; then on to Gullfoss, a magnificent waterfall, 16 miles distant. From this place we were to ride on an easy distance of 8 miles, to Geysir; and from Geysir a long ride of 42 miles, to Thingvellir; and from this last place, a distance of 34 miles, back to Reykjavik. Our expedition consisted of 61 ponies, 7 guides, 26 pack-boxes, 3 tents, and 8 of our own party. We spent the rest of the day in paying return visits to some of the Icelandic gentlemen, who had kindly invited us to their houses. Among these was a Mr. Jonsen, who spoke English most fluently and correctly, and regaled us with some fine egg-*schnapps*, and very good cigars, and who subsequently gave us much valuable information. On the following morning (Sunday) we were informed by a gold-laced policeman—by the way, the only one in Reykjavik—that if we started before three o'clock in the afternoon we should be fined, so we decided to send on our pack-ponies with our luggage, tents, and apparatus in front of us at once, and to postpone our own departure until the hour fixed by this officious limb of the law, occupying the two or three spare hours at our command by having a look at the interior of the Cathedral, and inspecting the Museum and Althing House under the guidance of Mr. Jonsen. As four o'clock approached we all mounted our ponies, and finally started off at a good round trot for our first resting-place, distant seven hours' ride. For a few miles we went over a tolerable road; but soon we had to turn off, and strike across country over a rough road strewn with lava boulders, until we came to a small rapid river called the Kalda. Here we dismounted for a quarter of an hour to rest our horses, and to visit the spot where the whole of this river suddenly disappears down a fissure in the ground, caused by an earthquake, We then re-mounted, and rode on as rapidly as possible to Hafnarfjordr, a beautiful little seaside town with lovely views. Keeping to our road, which became rougher and rougher as we proceeded, we turned our ponies' heads due south towards the sulphur mines at Krisuvik, and after passing over the roughest track imaginable through miles and miles of lava we commenced to ascend the chain of volcanic mountains which divide this part of the country from the coast-line south of the island.

It would be impossible to give an idea, by a merely written description, of the wild grandeur of the scene as we rode around and through crater after crater of these scarcely extinct volcanoes. I say scarcely extinct, for during the whole of our journey across this scene of wild desolation we constantly observed puffs of smoke issuing from holes and fissures in the earth, showing that the fires were not far beneath, and as far as the eye could reach there were nothing but calcined rocks, and mountains of huge lava blocks, twisted, torn, and heaped into every conceivable shape and form—in fact, it looked like the end of all things ; not a blade of grass or living thing to be seen or heard, and one could almost feel the dead silence that prevailed. When we reached the south side and commenced to descend into the plains below we beheld a sight not easily to be forgotten. In front and on either side was a succession of lava mountains, plains, and craters of extinct volcanoes ; and when the sun shone out, the prevailing hue, due to combination of every shade of colour, was one exactly resembling the bloom seen on a hot-house grape ; while at our feet we saw large volumes of smoke and steam from the boiling mud cauldrons and sulphur

Our Camp at Vogsosar beside the Lake Hlivarvatn.

pits, and through these masses of vapour we could discern our pack-ponies and baggage, which had preceded us. On a patch of coarse grass, and at a short distance from the edges of these awe-inspiring pits we decided to pitch our tents at about 11 p.m., and, after strolling about the place, to examine these extraordinary phenomena and the adjoining ground, which was tinted with every variety of brilliant colouring, while our evening meal was being prepared, we returned to our tent, ate our well-earned supper, and turned in for the night to—I had almost written bed—sleep. We prepared what did duty for a bed in the following manner: procuring two trusses of hay from the nearest friendly farmhouse, we spread it over the floor of the tent; on this we unfolded our waterproof ground-sheet, and on this we placed our sack-blankets, and for a pillow we used a pack-saddle, on which was folded a woollen rug. What better bed could one want?

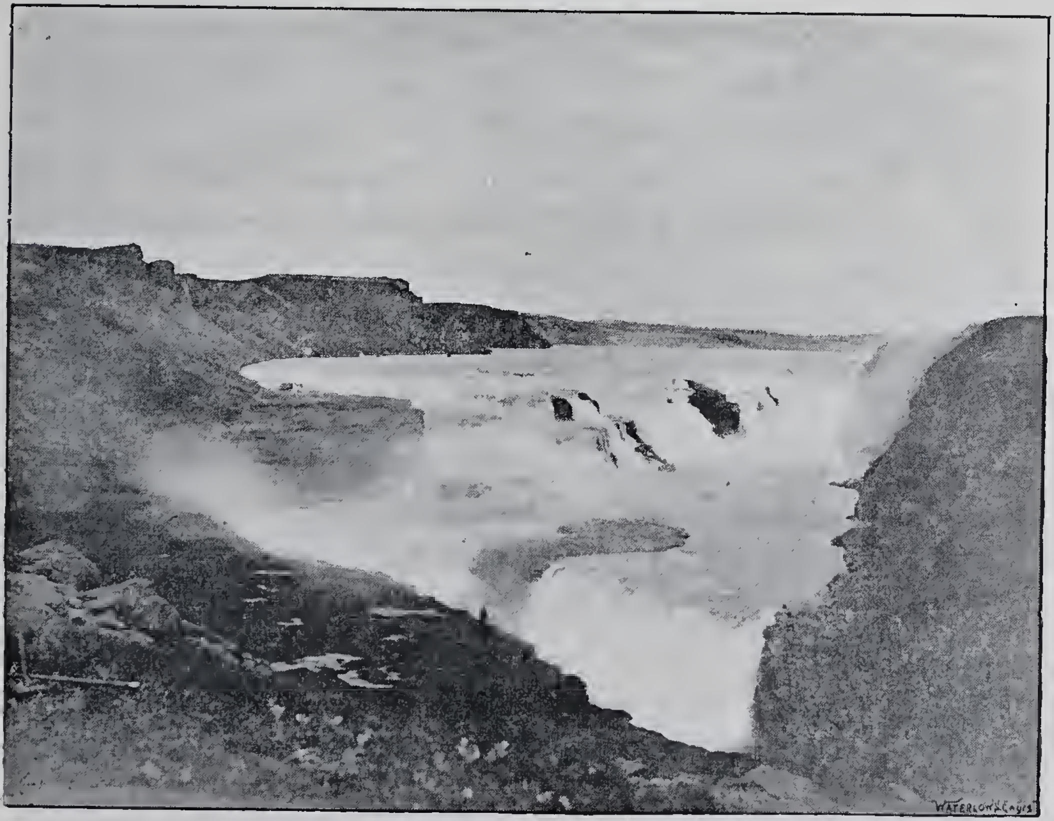
Main Street at Eyrarbakki, as seen from the Sea-shore.

About eight the next morning we were up and wandered about the place to photograph any interesting object we could see. A short, smart thunderstorm, lasting about two hours, drove us back to our shelter, and about twelve o'clock (midday) we packed up our belongings, mounted the ponies, and started to visit Krisurvikurberg, a few miles out of our way, towards the coast, to see the wonderful flights of sea-birds, and the brilliant colouring of the stratified lava rocks which form the cliffs in which these birds build their nests, and against which the sea dashes. After a stay of an hour we started for Vogsosar over the very roughest road in Iceland; in fact, the entire distance of sixteen miles is made up of immense lava blocks, and wide, deep fissures formed by the shrinking of the once liquid lava in the process of solidification. The confusion of surface appears to have been completed by a subsequent earthquake. We reached our destination between eleven and twelve (midnight), and pitched our tents on a rich piece of greensward, and within a few yards of a magnificent lake.

The next morning saw us up early. We started for Eyrarbakki at 11.30 a.m. on Tuesday, and arrived, after a capital ride and gallop over a good road (for Iceland), at 7 p.m., crossing on our way the Olfusa river in a ferry-boat, and walking three miles, knee-deep in loose black volcanic sand, along the shore to the house of Mr. Le Folii, in whose back garden we had obtained permission to pitch our tent. This gentleman treated us with great hospitality, and on the evening of our arrival invited us into his house, and entertained us with music and singing, etc., etc., until past midnight. The next morning we started out in different directions to view the place, and to photograph interesting sites. The view on p. 49, from a photograph I took early in the morning, will give some idea of the purely Icelandic appearance of the place when viewed from the sea. We started at 3.50 p.m., on July 9th, for Sandholaferja, crossing on the way the Thjorsa, a very wide but shallow river; and as we were now not more than twenty-three miles from Mount Hekla we got a magnificent view of the same. By this time most of us felt as if we were training for a circus as we galloped over the roads, so strewn with large lava blocks that we were astonished at not being thrown down. During this journey we called at Loptstadir Farm, and had some *skyr*. At 9.45 p.m. we arrived at our destination, and camped on high ground, and as there was nothing particular to notice about this place we turned into our blankets at once. At 11.35 the next morning, we started for Hekla, and after a very long ride of nine hours over a bog and fair road, and fording the river Rauviloken some fourteen times, we at length reached a farm called

MOUNT HEKLA, AS SEEN FROM THE GARDEN OF THE FARM (CALLED DALTARLAKR), AT A DISTANCE OF FIVE MILES.

Daltarlakr, about five miles from Hekla, and pitched our tent in the garden at the back of this farm, close to the top of a beautiful little waterfall, and prepared to stay there for one clear day, in order to enable those of the party who wished to ascend to the summit of Hekla to have an opportunity of doing so. The next morning, July 11th, three of our number, viz. Dr. Irwin, Mr. Paul Lange, and myself, in company with our head guide, Gudmundsen; decided to make the attempt; and after six hours' hard climbing we reached the crater, into which we entered. Mr. Lange being armed with a small detective camera, was enabled, with the help of the guide, to carry it to the top, and to take a photograph of the crater with Dr. Irwin, myself and guide, standing *in* the same. We believe this to be the first time that any one has succeeded in accomplishing this feat. The view from the summit of this volcano is magnificent; and one can distinctly see the Torfa-Jokull, the Merkr-Jokull, the Eyjafjalla-Jokull, the Westmann Islands, and, for a distance around the mountain, equal to a radius of, I should say, fifty miles. The tracks leading to and from the summit pass across lava-flows of the wildest description, intersected with some rapid mountain torrents which are fed by the melting glaciers on the summit. Although it took us six hours to ascend we were only four hours in descending; and congratulated ourselves that the day had been very fine and cloudless, so that we were able to see all that there was to be seen under the most favourable circumstances. I need hardly say that after such exertion we retired to rest as soon as possible, after reaching the farm. And on the next morning, July 12th, at 10.30, we left this place; and went on to Hruni, where we arrived at 5.45 the same day, after crossing the Thjorsa a second time. This village merely consists of three cottages and a little wooden church, hardly worth describing; so after passing the night here we started at nine o'clock the next morning (Sunday) for Gull Foss, a four hours' easy ride, the weather being beautifully fine. We arrived at this splendid waterfall early in the afternoon; and all those who could photograph immediately set up their cameras ready to attack it from all sides; and some fine views were obtained; but while we were at work close to the fall we realised for the first time, what a torment the flies—which swarm along the banks of the rivers in Iceland during the summer—can inflict. It is no exaggeration to say that the air is literally alive with them; they crawl into your ears, and up your nose, and one is fortunate indeed if he succeeds in taking a breath without a dozen or so of them getting into his mouth. The irritation caused by their persistent attacks nearly drives one frantic. You cannot frighten them off your body, they must be literally swept off in thousands. They got into our cameras and swarmed on our lenses till we nearly despaired of being able to take a view at all. Any one contemplating a visit to these parts should certainly provide himself with an ample gauze or net veil, if he wishes to have one scrap of comfort,



THE GULL FOSS WATERFALL ON THE HVITÀ RIVER.

Turning our backs on these pests we made straight for Geysir, a pleasant ride of eight miles; and after fording a considerable number of narrow, but deep and very rapid, rivers arrived about 5.30 p.m. the same day. We found to our delight our tents, which had been sent on in front of us, already pitched. After supper we went out to explore the neighbourhood of the springs; and a truly wonderful sight presented itself. Over a space of about five or six acres there were scattered some twenty boiling springs, most of which were in a greater or less state of eruption. The largest of these springs is, of course, the Great Geysir, which is now seldom in full action oftener than once in every ten or twelve days, and we were not fortunate enough to witness a full outburst. We did, however, see the big column rise some twenty feet into the air on two separate occasions, and considered ourselves lucky to see this much. The basin of this spring is situated on the top of a mound of laminated substance, about twelve or fourteen feet in height, composed of almost pure silica, formed by successive deposits of this oxide from the overflow water, which in the boiling state appears to be highly charged with mineral matter. The next in order of importance and violence of its action is Strokkr. This last-named spring can always be lashed into fury by choking the tube—a hole in the ground about eight feet in diameter—with large masses of turf; and one such eruption produced in this manner, and which reached to the height of about one hundred feet, was photographed by me and some of our party. Perhaps after the Great Geysir the object that attracted most attention was "Blesi," an underground boiling lake, with a portion of its roof broken in, for through the aperture thus formed one could on close observation see far down into splendid caverns below, the walls of which were crusted over with pure white silica, which, through the great depth of crystal-clear water, appeared of a pale apple-green colour. The spectacle was one of a fairy-like description which we longed, but were quite unable, to photograph. The rest of the springs were comparatively insignificant, except so far as they afforded evidence of the existence of one vast underground boiling lake, at an uncertain depth beneath the surface; and one could not avoid the impression that the ground on which we were walking and which formed a roof over the lake, might, during one of the tremendous explosions of the Great Geysir, suddenly give way and be precipitated with anything which might be upon it, into the seething cauldron below. The next morning, having completed our survey of this extraordinary region, we had our morning meal, and started for Thingvellir; and after a nine hours' ride over a road that at first was very good, and afterwards exceedingly rough, although very interesting, we arrived at our destination at twelve midnight. On the journey we halted two or three times for refreshment, and

Strokr during a Full Eruption.

to rest the ponies; and the first place of interest we came to was a broad but shallow river, called the Bruara, in the centre of which there is a deep rift or crack, into which the greater bulk of the water rushes. Over this rift, which is about twenty feet wide, a wooden bridge is thrown, the floor of which is itself some inches beneath the surface of the water. After examining the bed of the river and this curious little bridge we rode on to a farm situated about half way to Thingvellir, there to await the arrival of our pack-ponies. Having obtained some *skyr* and hot coffee, with biscuits, from the farmhouse, our party divided—some of us preferring to have a quiet sleep on the newly mown hay, while the others took a stroll for a mile or two along the banks of an adjacent lake to see some more hot springs. As soon as they returned, and our pack-ponies had arrived, we were again on our way; and after riding through some weirdly grand scenery, caused by volcanic eruptions and earthquakes, we at length descended into the plain of Thingvellir, and soon found ourselves in the guest-room of the parsonage, about twelve midnight. Unfortunately our tents and pack-ponies did not arrive until two hours afterwards, so three of our party, who were throughly tired out, slept in the parsonage, while the rest of us beguiled the time by smoking and chatting until 2 a.m., when we had the satisfaction of seeing the pack-ponies with our tents coming in at a sharp trot, and very soon we pitched our camp in the churchyard and turned in for the night.

THINGVELLIR CHURCH, GUEST-ROOM AND PARSONAGE.

On the following morning we started in different directions to take some photographs of the surrounding scenery, which, in many places is charming; and very soon the parsonage and Church, the Hill of Laws, Flosi's Leap, the Almanna Gia Waterfall and Rift, etc., were duly recorded on our dry plates. Two of our party, who started out by themselves for a mile or two to see some of the lava flows, got caught in a sharp shower and drenched to the skin, as they had thoughtlessly left their waterproofs behind them. The evening of this day was spent by us all on the extreme end of the Parliament Green.

Waterfall in the Allmanna Gja Rift near Thingvellir.

At three o'clock on Wednesday afternoon, July 16th, we started for Reykjavik, and after five and a half hours' sharp riding we once more found ourselves in the capital, and were not sorry to again enter into civilised life and habits. The next day, July 17th, was spent in transferring our luggage from the pack-boxes to our own trunks and portmanteaus, and arranging for our passage to

Granton, *viâ* the Faroe Isles in the Danish boat *S. S. Romny*, which was to start at nine o'clock on Friday, July 18th. On the morning of this day we started from Reykjavik, and steaming slowly down the Faxa Fjord we were soon out of sight of the town. We had started from home, knowing comparatively nothing of each other, but from the first moment of our mutual acquaintance until we finally parted company at the Waverley Station, Edinburgh, there had never been one word of discord—in fact, during the whole time that we were in Iceland, each one of the party seemed bent on thoroughly enjoying himself and making the best of everything, and in contributing so far as he could to the comfort of all the rest; added to this during our pleasant journeyings the weather had been simply perfect.

On our way homewards we called at the Westmann Islands, and took on board a few passengers, and then left immediately for Westmanhaven, Faroe, which we reached on Sunday, July 20th. From there we went successively to Klaksvig, Thorshaven, and Trangisvaag; and after a very ugly passage to this latter place we steamed straight for Granton, at which we arrived on Thursday, July 24th, passing on our way between the Orkney and Shetland Islands.

Having now come to the end of our tour, it may perhaps be useful to intending visitors to this island if I give a few hints as to necessary articles of clothing for such a trip. It will in any case be advisable for the tourist to have a thick serge double-breasted reefing jacket, a thick serge waistcoat, buttoning closely up to the throat, two flannel shirts, two under-vests, breeches, two pairs of thick worsted stockings, a pair of sea-boots, a pair of light shoes, a Lucknow canvas cap, with pugaree, a large gauze or net veil, a thick knitted stocking travelling cap, an old pair of slippers, a sack-blanket, a thick waterproof ground-sheet, and a couple of woollen rugs; a mackintosh Regulation cloak and a sou'wester. Any other articles of clothing will readily suggest themselves, but it is strongly urged that no more be taken than is *absolutely* required.

In conclusion, I would say that if anyone is out of health, and requires a thorough change of scene and fine clear bracing air and an entire relief from professional or business worries, he cannot do better than arrange a trip to Iceland ; as the writer can personally testify to the efficacy of the remedy, and to the reasonable amount of the expense involved.

J. REYNOLDS.

ON THE USE OF A NEW ACCELERATOR IN DEVELOPMENT.

VARIOUS modifications have been made from time to time in the alkali used as an accelerator in developing dry plates; but the choice, so far as I am aware, has been limited to the hydrates or carbonates of potassium, sodium, and ammonium. Of these there is no doubt that ammonia is both the most generally useful and the most generally used. The chief objections to its employment are its volatility, its pungent odour, and its liability to produce green fog. The hydrates of sodium and potassium are inconvenient on account of their powerful caustic action. Could we find an accelerator as energetic as ammonia, and without its many defects, it would be, I believe, a distinct advantage.

It had often occurred to me that lithium, on account of its low atomic weight ($Li = 7$), might prove to be an efficient substitute for ammonia; and, as I could find no mention of its use in this respect in any authority to which I had access, I determined to institute a few experiments in order to ascertain its value, if any.

A solution of lithium carbonate $Li_2 CO_3$ was first prepared by dissolving forty grains in ten ounces of distilled water, each ounce, therefore, representing four grains of the salt; and this solution was used as a matter of convenience in making up the developer.

Ex. 1.—Two exposures were made, under exactly similar circumstances, on an ordinary garden scene, with foliage and buildings, at end of June, sun shining, lens *f*/32, a quick hand exposure being given in each case (cap off, cap on). One plate was developed in the ordinary way with pyro. and ammonia—

Pyro.	2 grains.
Solution of ammonia	2 minims.
Bromide of potassium	1 grain.
Sulphite of sodium	12 grains.
Water	1 ounce.

The other was developed with the same formula, but *substituting two grains of lithium carbonate for the ammonia, and omitting the bromide.* With the first plate the high lights began to appear in thirty seconds, and development was completed in five minutes, exposure appearing to be about normal. With the second the high lights began to appear in rather less than half a minute, and the plate was fully developed in four minutes. Both were good printing negatives, the one developed with lithium carbonate having rather more density in the high lights, and more detail in the shadows.

Ex. 2.—A second pair of plates was exposed on the same subject under similar circumstances, using a larger stop (*f*/20) and developed similarly to the preceding. The results in each case were the same as with the first pair, development being finished in a somewhat shorter time.

Ex. 3.—Two plates were purposely under-exposed on a portrait. Here as much image was obtained by the lithia developer as by the use of a developer containing a large proportion of ammonia. In the latter case the negative was an excellent example of green fog; in the former there was perfect freedom from fog.

Ex. 4.—A portrait taken out of doors and over-exposed was developed with the following :—

Pyro.	2	grains.
Carbonate of lithium	1	grain.
Bromide of potassium	½	grain.
Sulphite of sodium	12	grains.
Water	1	ounce.

This gave an excellent black-and-white negative of good printing density, and quite free from fog.

These few experiments show, I think, that lithium carbonate may be used to replace ammonia in the developer in about the same proportions, a grain of the lithium salt being nearly equal to a minim of ammonia. The advantages are—that the solution of lithia is odourless and non-volatile, and that it produces more detail than ammonia, with an absence of fog. The smallness of the quantity of lithia needed is also a distinct advantage as compared with the sodium and potassium salts.

H. A. Wickers.

A DYNAMICAL THEORY OF COLOURS.

THE theory of colours at present in vogue was originated by Young, adopted by Helmholtz, and is known as the Young-Helmholtz theory. It regards red, green, and violet as primary colours, and the rest as secondary. The distinction is based on the fact that while orange, yellow, blue, and indigo (as also white) may be formed by blending properly chosen rays, neither red, green, nor violet can be thus compounded, but seem to behave themselves like the simple substances which the chemist calls elements.

The theory of three primary colours adopted by the physicist compels the physiologist to assume a corresponding or suitable structure in the retina of the eye. He has to suppose that we possess three primary colour sensations—that the "rods and cones" of the retina are in three sets, one being most impressible by red rays, one by green, and one by violet. Yet each set is affected at the same time by the rays proper to the other two, and in endlessly different degrees, according to the shade of colour. If the microscope showed such a structure of the retina it would be valuable evidence; if the philosophers were agreed we might hesitate to propose anything else. But Helmholtz himself confesses that we have at present no anatomical basis for this theory of colours, seeing that in the retina itself no such distinction of fibres can be found. The most serious opponent of the Young-Helmholtz theory is Hering, who maintains that the primary visual sensations are white and black, red and green, blue and yellow, which form antagonistic rather than complementary pairs. But Hering's theory is hardly more simple than the other; and I believe it is admitted that no existing theory of colour perception is much more than a speculation.

There may be no presumption, then, in suggesting that as light is a mode of motion, we should fall back upon the undulatory theory, and remember that all sensations of colour are produced by multitudes of little waves. The vibrations can be counted, the wave-lengths can be measured, the refraction of rays through lenses is understood; everything invites us to study the problem on the physical side, and not to seek a solution in chemistry or metaphysics.

When Newton caused a sunbeam to pass through a prism, the image was drawn out to a length five times its breadth, and was no longer white, but divided into bands of different colours. It appeared that the light of the sun was a mixture of all these colours, and the prism had separated them by refracting them in different degrees. If the colours be received on seven mirrors, and reflected at such angles as all to fall on one spot, they unite and form white light again.

Newton found means of measuring the beats or vibrations of the *ether* proper to each colour, and I shall here copy the table, simply correcting the figures, to bring them into accord with the corrected velocity of light. In doing this I have had to work strictly by the arithmetical rule of proportion, and therefore it is impossible that I should twist the figures to serve any theory.

We observe that the scale of colours has its place at an enormous height above the gamut of sounds, and we now have to do with billions of vibrations per second instead of with hundreds.

Extreme violet	727,000,000,000,000.
Violet	699,000,000,000,000.
Indigo	658,000,000,000,000.
Blue	622,000,000,000,000.
Green	577,000,000,000,000.
Yellow	535,000,000,000,000.
Orange	506,000,000,000,000.
Red	477,000,000,000,000.
Extreme red	458,000,000,000,000.

These vibrations are not caused in air, like the vibrations of sound, but in an ether which pervades all space, and which can pass through glass as readily as wind passes through a forest of trees. Its waves are so small that, on an average, there are fifty thousand in one inch length of a sunbeam, and the rapidity with which light makes its way to us from the sun and stars is 186,000 miles per second. We notice that our perception of colours is limited to one octave, whereas the ear takes in several octaves of music. But there are vibrations below the red, which possess a heating power, and others above the violet, which exercise a chemical influence, while both might be manifest to other eyes than ours.

It would be an anomalous thing if, while the colours are a regular series, and the tints of the spectrum pass into one another by slow gradation, three of the colours should deserve to be called primary and the other four secondary, or derivative, or compound. Another anomaly is this, that while white light is said to be the sum of all the colours, white can also be formed by red and green together, although the sum of their numbers or energies must be much less than the total of all seven. In seeking to solve the problem let us use an illustration drawn from the scale of temperatures. Heat as well as light is a mode of motion, and radiant heat is closely related to light; but all heated bodies have their particles in a state of agitation, and our analogy will be legitimate if we take it from heated water. If we mix a pint of water at 80° with a pint at 100° we shall get a quart of water at 90°, that is to say, we obtain double quantity and medium temperature, medium rate of motion. The total amount of motion remains exactly what it was, for what the one pint has lost the other has gained. Let us take two colours of the spectrum and add them together; must we not suppose that the motion of the one will fall, the motion of the other rise, meeting in a mean? It will amount to the same thing if we take wave-lengths instead of vibration numbers. Here are the wave-lengths in fractions of an inch:—

Extreme violet	0·0000167
Violet	0·0000174

Indigo	0·0000185
Blue	0·0000196
Green	0·0000211
Yellow	0·0000227
Orange	0·0000240
Red	0·0000256
Extreme red	0·0000266

Let us take the figures for red and yellow (neglecting the noughts, which are equal in both) and obtain the mean, thus: add 256 to 227 (=483) and divide by 2 (=241½), which is the medium wave-length. It will be seen how near this is to 240, the wave-length of orange, which is the medium colour. The medium between the figures for blue and yellow is 211, which is the figure for green exactly; and for others, also, we get close approximations. We are led thus to regard each colour as a medium between the two on either side of it. Orange can be compounded of red and yellow, because its wave-length is the medium between those two. Proceeding the reverse way, orange may be analysed into red and yellow as its constituents.

But while, theoretically, green should admit of being compounded of blue and yellow, and of being analysed into those colours, it is found that a practical blending of blue and yellow light produces white, and not green. Green has been regarded as a primary colour because it cannot be analysed into two others; and red and violet are classed as primary colours for the same reason. This difficulty I have to meet. The solution is easy in the case of red and violet, for the accident of their position at the extremities of the scale gives them one companion colour only instead of a companion on either side. They cannot be compounded, because one of the two necessary constituents is absent from the visible spectrum. Yet this does not arise from any property of red and violet as colours, it arises from the limited powers of the human eye. While the ear takes in and appreciates several octaves of sounds, the sensitiveness of the retina is limited to one octave of colour. But as there are creatures that can hear higher up the scale, or lower down, where man ceases to hear, so it is conceivable that eyes should exist sensitive to a wider compass of colour, so as to see other colours below the red and above the violet. To such eyes red rays might be compounded from the rays below them blended with the orange rays above; and so it would be demonstrated that red is not a primary colour. The same with violet. No colours are primary, and none are secondary; the distinction has no meaning.

We might as well say that in a series of seven figures—9, 12, 15, 18, 21, 24, 27—the figure 12 is compound because 9 + 15 = twice 12; and 15 is compound because 12 + 18 = twice 15, etc., but that 9 and 27 are not compound because the same method is not applicable to them.

But I have to try and meet the difficulty about green, which resists the attempt to resolve it into any constituents, although it is in the middle of the gamut of colours and not at either extreme. There is something very peculiar about green, and there is a remarkable relation between green and white. The union of blue and yellow rays of light produces white and not green; and this is remarked upon by Helmholtz as the most striking difference between the mixture of pigments and the blending of coloured rays. In Newton's rings, again—produced when a plate of glass is pressed upon a lens of almost imperceptible curvature—the order of colours is as follows:—1st ring: red, orange, yellow, *white*, blue; 2nd ring: crimson-red, vivid yellow, *yellow-green*, blue, violet. Similar phenomena are shown by the rings of the interference spectrum, obtained when a very slender sunbeam, passing through a small pin-hole into a dark room, is received on a white screen or a plate of ground glass. What is the explanation of this relationship of white to green—a relationship so close that they sometimes replace one another? It is commonly said that white light is a mixture of all the colours, the sum of all the colours; or, in physiological terms, that when all the several kinds of rods and cones in the retina vibrate together white light is perceived. But how can this be made to look consistent with the scale of vibrations? If we add together the vibration numbers for all colours we get the high total of 3,946 billions, which carries us more than two octaves above the violet for the proper place of white light. This would not suggest any affinity with green. But on the dynamical theory which I am explaining, the blending of all the colours results in a fusion of their waves into one form of wave of medium length, and that length (neglecting the noughts) is 213, while the number for green is 211. Thus it appears that white is really a colour of the spectrum, with its place immediately below the green,[*] and differs from green by only a shade in its physical substratum. Hence the difficulty of compounding green; we blend blue (196) with yellow (227), hoping to get the true medium (211½ = green), and we actually produce white (213). No doubt it is failure, but it does not show that green is a primary colour and indivisible; it only shows that in our effort we go astray somehow, by the minutest quantity. This is a small objection to the dynamical theory, compared with the anomalies of the theory of three primary colours.

White light may be formed by blending red and green, or any other pair of complementaries, as well as by adding together all the colours of the spectrum. The colours given as complementaries by Dr. Michael Foster are the following:—

Red (near *a*)	with	Blue-green (near F).[†]
Orange (near C)	,,	Blue (between F and G).
Yellow (near D)	,,	Indigo-blue (near G).
Green-yellow (near E)	,,	Violet (between G and H).

To these, it is said, may be added the peculiar non-prismatic colour purple, which, with green, also gives white. Take any of these pairs, say red and green, and add their vibration numbers together—477 billions + 577 billions—and you get a number (1,054 billions) which is high above the violet of the spectrum.

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[*] If we strike the medium of the vibration numbers instead of the wave-lengths we get 582 billions, which is immediately *above* the green.

[†] These letters refer to Fraunhofer's lines.

Orange and blue, added, come to 1,128 billions; yellow and indigo 1,191; green and violet 1,276. Thus, on the common theory, all these whites are to be placed high above the violet (where, in the spectrum chamber, we see no light at all), and yet not nearly so high above as the white which is the sum of all the colours, and whose figure, as we have seen, is 3,946 billions. It seems incredible, when colour distinctions depend on differences of vibration, that one white should require three or four times the rapidity of another. By an addition of about 30 billions red light becomes orange, or orange becomes yellow; but by an increase of two or three thousand billions no difference is made! On the dynamical theory, however, we take the *mean* of two complementary colours, and we find that it does not differ much from the mean of the full scale. The several whites may be compared with one another and with green as follow:—

Mean of Vibration Numbers.

Complementary pairs: red and green	527 billions.
,, ,, orange and blue . .	564 ,,
Green rays alone	577 ,,
Full spectrum: all colours	582 ,,
Complementary pairs: yellow and indigo . .	596 ,,
,, ,, green and violet . .	638 ,,

Mean of Wave Lengths.

Complementary pairs: red and green . . .	0·0000233½
,, ,, orange and blue . . .	0·0000218
Green rays alone	0·0000211
Full spectrum: all colours	0·0000213 nearly
Complementary pairs: yellow and indigo . .	0·0000206
,, ,, green and violet . . .	0·0000192½

Judged by either of these tables all the varieties of white approach to the position of green, and all the whites formed from complementary pairs are seen to be near neighbours to the white of the full spectrum.

The dynamical theory gives a satisfactory result also in the case of purple and green, which yield white on mixing. As purple is not a colour of the spectrum, but is formed by blending red with violet, we first strike the mean between these two colours,—the mean wave-length, neglecting noughts, is 215,—and we regard this as the figure for purple. The mean between this and 211 (green) is 213, the number previously arrived at for white by taking the mean of the full gamut of colours. But the various whites are not all bound to have precisely the same wave-length, any more than various shades of red or green.

If I am right thus far, and there are not three primary colours in the spectrum, we need not imagine any longer that there are three primary colour sensations in the eye, or three sets of rods and cones as the apparatus. On the contrary, we must look for a simplicity within the eye corresponding to the simplicity without. It may, perhaps, be the function of the rods and cones to receive all the rays that fall upon them, and blend them into waves of uniform length, so as to produce one sensation proper to the union. The cones being of larger diameter than the rods may, perhaps, be a provision for the larger waves, or for fuller tides of whatever colour. Both rods and cones may possibly be minute tubes for conveying minute waves a stage farther. I conjecture that what a ray gives up in rapidity of vibration (in blending with rays of other colour) it absorbs in larger wave-length, the total quantity of motion remaining the same. The law of the conservation of force, indeed, seems to require this, if we accept a mechanical explanation at all.

This conception of the function of the rods and cones, which constitute the outer or deepest portion of the retina, makes that layer to be like a tesselated surface, or an apparatus for rendering uniform and definite each minute part of a tesselated picture. Yet all traces of the division lines escape our consciousness, because the rods and cones are so exceedingly small—only $\frac{1}{14000}$ of an inch in diameter, or forty-nine millions of them in a square half-inch!

The theory of colours and colour sensations here set forth receives strong support from the beautiful manner in which it explains the phenomena of after images. But I have no space left for this part of the subject. Suffice it to say that the green image perceived after gazing at a red object is not the result of fatigue of the retina, nor owing to an opposite chemical condition of the rods and cones, but that all phenomena of the class can be explained mechanically or dynamically, and calculated beforehand.

George St. Clair.

PHOTOGRAPHY WITH AN OBJECT.

I KNOW little about phrenology, and have never interviewed a phrenologist. But were I to ask one what bumps he most often found upon the English human head; what, as well, was usually the most fully developed bump, I have little doubt he would reply "That of combativeness." The infant wants to walk when he ought to be carried, to be carried when he should walk. The schoolboy is blatantly contradictory to other schoolboys, and his phrenological bump is, therefore, often largely accompanied by others of a less lasting nature, but in a more highly coloured condition. And the man;—does he not, when successful in the fight for existence, experience, in addition to the natural satisfaction of avoiding or conquering adversity, an exultation in contending with other men? Everywhere stress is laid upon the fact, directly or indirectly, that one man is pitted against another, or one body of men against another. Take up any pursuit, and you are immediately brought into contention with other people. That is the natural course of things; but even were it not, no one could rest content without something to fight about, and a cause would be created where none naturally existed. The bump of combativeness is always causing divisions between members of the same race. It governs politics—where black is sworn to be white merely out of antagonism; it influences scientific opinion, and is the guiding power of recreation. It sways religion, and has been and is the cause of bigotry and persecution. And yet, in most cases, people commence by taking a pure interest in their pursuit. It is generally after some knowledge is acquired that familiarity breeds contempt for what were previously wonders,—and because wonders so many incitements to learning their causes, and a man begins to think he knows "something," and is entitled to be dogmatic, is justified in joining some clique, school, or party, or is even quite capable of starting any one of these for himself. This is lamentable from some points of view, and most entertaining from others. It is sometimes sad to see so much energy and so many talents engaged in a wasteful warfare; but what the world would do without the excitement produced by the many stirrings up continually taking place, what society at large would find as a substitute for the entertainment provided by such a combat as that between a Gladstone and a Tyndall, it would be hard to say. If people, when they attain knowledge, instead of looking around, and poking and prying into the corners of other men's minds, to ferret out some cause of disagreement in order to drag it triumphantly into the light of day, would only content themselves with mutually improving discussion, and employ their acquired knowledge in some practical and useful way, the world might, it is true, have to seek amusement at the pantomime more often, but it would, of solid benefits, be vastly the gainer.

In the case of photography, when a man is learning, he is absorbed in the pursuit of the requisite skill, and is constantly refreshed by coming into contact with something striking, beautiful, and novel, and so his mind is kept in a state of activity. The faithful delineation upon his focussing glass of nature in any form, under almost any aspect, the gradual appearance from invisibility of that nature as portrayed upon the sensitive plate;—one might almost say the invocation of the spirits of bygone scenes, by the spells of chemical power, are indeed wonders for more than seven days. But, sad to say, these pall. The developer mixed with so much care and thought is some day jumbled together instinctively. The photographer rests on his oars, so to speak, and looks round.

And then it occurs to him—not, what a pleasure to visit say that corner of Surrey where the dark-green pine-trees and the patches of bare, bright red sand share the sides of the hills, where the odoriferous glades present pictures to those who seek; or that other spot where thatch, chimney, lattice, and plaster, have been supplemented by the growth of matter, with river, rocks, trees, and tangled undergrowth, until a gem of picturesqueness is there. Not that at all; but that his work is now quite good enough to exhibit, that he would be proud to get a medal, and why shouldn't he? There are so many exhibitions and so many medals. There is certainly nothing to be said against exhibitions and medals; they are stimulants. But in the majority of cases the love of photography is *less* than the desire for competition and the avidity for distinction, and when this is so Art and Nature are lowered in a pitiable manner. This state of things is growing, because, for one reason, beginners are now less encouraged to think for themselves. The photographic press is continually saving them the trouble of mental exertion or the exercise of any kind of discernment or discretion. Tell a man that in such and such a neighbourhood he will find beautiful subjects if you will, but I beg to protest against an identical spot where a picture may be found, the exact time of day when it should be taken, the very point of the compass, indeed, to which the lens should be directed, being dryly stated in guide-book fashion. Such as these things may well be left for a man to find out for himself. Soon the ground around our beauty spots will be marked with little pegs arranged in triangles. These are the spots where you must place the legs of your tripod. But a little longer, and they will be fenced in, a caretaker of each appointed, and a charge made to "The Point of View." This is the way to *stifle* thought, and surely that is not desirable. A man must have a certain amount of mental activity to engage in photography; merely taking it up proves it; and this natural activity should be encouraged and directed. It is this activity which leads so many, as soon as they have acquired a certain amount of familiarity with photography, and, therefore, want something fresh upon which it may be exercised; it is this activity, prompted by that bump of combativeness, which leads them into contention and competition

They want something against which they may direct their energies, or in which they may exercise their knowledge. Photography, as such, no longer pleases with so much of its old charm. A definite object is needed, and some goal must be given or suggested for them to attain to. Obviously the object of the professional is to make money, and no doubt many will say the object of most amateurs is equally obvious. That is, to amuse themselves. But this is indefinite, and more than that, not as profitable to the man seeking amusement as the possession of a more definite object would be. As recreation to a busy man, the benefits arising from merely wandering about the country with a camera one spare day, and photographing his friends another, are many; but there would be additional advantages gained, and great ones too, were he to say to himself, "I have a main idea or purpose in photographing, and my object is to obtain pictures to illustrate that same idea or purpose." What do members of a club usually do when on an excursion to a picturesque district? They scatter themselves broadcast, "seeking what they may devour," their only object being to expose as many plates as possible. They are not always encouraged to do this, however. Some societies have had given them a truly great and worthy object in surveying particular counties and districts. The system to be adopted has been constructed and explained in the fullest manner. Those who own cameras, those who are so frequently sniffing up ammonia from a developing negative of the back garden or the village pond, let them go out now inspired, spurred on by the knowledge that they possess power to be really useful, animated by a wish to produce something valuable, and making for a tangible point which is to be seen straight ahead of them. There is no reason why anyone should be *entirely* absorbed in surveying work, but there are many for urging that the prosecution of such should form a principal idea or object in photographing. There must be a charm in setting out, in that you have your plan mapped out for you; there must be another charm in progress, inasmuch as knowing what you have to do, no time is lost; and yet many other charms are revealed in new experiences, new information, new aspects of things once of no interest, but now absorbing. There is a charm about completion as well, because there lies your work, not so many exposures made during your holiday, but evidences of new knowledge, and suggestions for fresh ideas.

It must be said that to some minds, especially those who go in for "picture-making," surveying work, to illustrate, say, the architecture or the life of the people in some particular district, would prove too dry and narrow, as presenting comparatively little opportunity for independence. Given a printed programme, and although you are most properly left to choose your own time, and work in your own way, you may possibly have no share in selecting the subjects. Your business is confined to illustrating in the most effective manner at your own discretion the subject suggested, and your artistic abilities, though certainly employed if you will, are more certainly cramped. What could be a more pleasing object to such artistic souls, than to illustrate a favourite author? They can choose their own subjects from his pages, they may visit the home of his hero with his work as their photographic exposure book. And having chosen their subjects, they can spend time and thought over obtaining a picture of each, so much the more of both time and thought being spent because of the associations conjured up, and because of that interest we all feel, when reading in fiction of places we know are so real, and which makes us invest forthwith the creatures of fiction with a fictitious reality, all on account of our intimacy with the homes our author has placed them in. Supposing we go "Westward Ho!" with Kingsley. Is there a man who has not read his book? Is there a man who has read his book, and has not been stirred by the action in it, excited by the passions portrayed therein and affected by its sweetness? If so, he must be one who would go through Devonshire without ever giving a glance down her beautiful lanes, who would vote her moors but wretched deserts, and her seaside villages "beastly dull." The object of such should be the use of a "Kodak" on

Margate sands; but let true lovers of art and nature spend some time in Devonshire with their cameras, and let *their* object be to obtain a series of photographs to illustrate Kingsley's "Westward Ho!" The book should be read before starting, and all passages suggestive of feasible photography marked. Then proceed systematically to work. There is a picture in the first few lines of Chapter I.—"The little white town of Bideford;" a good subject for a frontispiece. Clovelly Dyke, may or may not exist now for all I know. Here is something to look for, and when found may form another picture to illustrate Chapter III. And though in Chapter V. Bursdon and Welsford Moors are spoken of as being then as now "unbroken by tor or tree, or anything, save few and far between, a world-old furze-bank which marked the common rights of some distant cattle farm," yet when accompanied by some beauty of cloud effect, they will no doubt supply a pictorial suggestion of the spot where Amyas Leigh and Will Cary "stood and watched," and listened for the sound of horses' steps coming up from Welsford Moor. Going at random through the rest of the pages of what has been called, I believe, "a prose epic," take Chapter XII., for instance, very first lines: "Every one who knows Bideford, cannot but know Bideford Bridge." In fact, to those versed in photography, who are already acquainted with the book, another perusal with this object in view will amply repay so far as the parts relating to Devonshire are concerned. They will be repaid by the new occupation given them, which will employ many pleasant days; by the more intimate acquaintance gained of natural beauties which merely to read about is delight; and by the more sustained interest they will feel in their hobby.

To anyone who possesses favourite authors, names of books will occur. There are Dickens and his "Pickwick Papers." A man with time and money, once taken with the idea of illustrating these, would keenly enjoy doing so, even if to obtain merely *one* picture of a spot immortalised by the magic pen, necessitated travelling many miles. Some of those old inn yards would then be subjected to more thought and care in photographing than ever before were bestowed upon them for a like purpose. To a previously idle man, of literary and artistic tastes, this application of photography will supply a really absorbing occupation. The genius of Scott will lead him to the Border, to the banks of many a burn, to ancient battle-fields,—those cemeteries of chivalry without gravestones,—and to decrepit but poetic ruins. With Lytton he may enter Conway and traverse Welsh passes. One author will act as his courier abroad, while another may draw his attention to something in the next street.

Of course the illustrations would be printed in platinum, with a margin to be preferred. A good plan would be to purchase a cheap edition, but a well printed one, take it to pieces, and have the photographs bound up with the letterpress in a good binding. Inserting fresh and possibly thick sheets in an already bound book is not the way to produce a presentable appearance, nor the way to do justice to what should have been the outcome of much time and consideration.

So much for those who are chiefly landscape photographers. There are a large number of people to be considered who are much given to exposing plates on their acquaintances, friends, and relations. To such it may be suggested that to set about the formation of a small gallery (so to speak) of portrait groups would prove a most interesting occupation. As it is, what becomes of the result of much of this work? Some copies are given away to those photographed, it may be taken for granted. But the amateur himself very likely does not trouble to keep a copy for himself, and if he should have a print it will perhaps be found somewhere in one of his albums, while another print of another group is in another album, or may even be lying loose in a drawer, or be preserved in the shape of a lantern slide. Why not have family groups of one's friends taken at their own homes, each separately framed, hanging altogether in one part of the room? They are interesting now, and will be more so in years to come. Why then hide them away or scatter them about, so that they required to be sought for or collected?

Those who work a lantern are specially likely to be led to adopt a systematic course of work, because they have so long seen professionals publishing lantern slides in sets or series. However beautiful they may be, a display which is constantly jerking you about from New York to Timbuctoo, from Timbuctoo to St. Petersburg, and so on, is not nearly so much appreciated, and most certainly is not so useful as a connected series illustrating something in particular, even when accompanied by the most meagre explanation. A most beautiful collection might be made of the river scenery of England, though that may seem rather a large order. If so, photograph say every set of village stocks you come across, until a collection of views of those curiosities is in your possession. Inquiries will naturally be made about each, and in that way, quite a small history could be written. To people fond of instantaneous work, and living in a favourable locality, the formation of a series of views illustrative of military life would open up a great field, prove most interesting, and result in extremely attractive pictures, if they were well done.

They say that specialism breeds narrow-minded men, or more correctly, men of a limited range of thought; but certainly in photography one thinks of a specialist firstly as an expert in his particular line, and any idea that he is possessed of narrow views is a long way secondary. A man who is always photographing yachts sailing at full speed and hardly anything else, until he produces results, habitually too, to which you can only apply the adjective "wonderful," is one whose work we admire, and whose opinion on any subject is probably never questioned as being less sound than that of an all-round man. Probably he was, previously, a pretty fair average all-round man, and is competent to speak on most matters. He becomes a tip-top man by concentrating all his energies upon the pursuit of one idea, and by devoting all his time to following a particular line. So far from being deterred by the fear of contracting an unenviable individualism, what some have attained to already is the greatest encouragement to others to follow their example. Gambier Bolton's zoological series is a triumph of perseverance. It is recognised by the highest authorities as a mine of information to the natural history student. Must not the knowledge of this be a supreme satisfaction to the author, and amply repay for the time and work spent over the patient exposure of tens and tens of plates until a truly perfect picture was obtained of some one subject, without which the collection would have been incomplete? Stevens's flower studies we do not so often see now at Pall Mall, but those who remember the pleasure they gave can easily recall the exquisite rendering of the waxiness of a petal, the light airiness of his maiden-hair ferns, or the depth and softness of the shadows within the throats of his lilies. Then quite recently there was exhibited a large collection of portraits of R.A.'s, which, apart from their value as such, were some of the most clever examples of photography in an ordinary room (though an art studio is perhaps better lighted than most rooms not made for photographing in) ever seen. Only the other day a paper was read on the pigeon-houses of Herefordshire and Gower, before the members of the Royal Archæological Institute at Gloucester, illustrated by means of lantern slides from negatives taken during a hunt through the districts mentioned for old and interesting dove-cotes.

So in great ways and little ways may photography be applied in a methodical manner, and, good milch-cow as she is, yielding so much of the milk of human enjoyment, may be induced to give even more if treated properly. There are, it is true, times when a man may enjoy nature best without the company of his camera, when he sees things not photographable. He will wander across the fields, unencumbered, on these September mornings; across the fields so wet with dew, with drops so large it might be thought they were the tears of the morning light shed in weeping, because the nights were stealing from her more and more as they grew. He will like better, sometimes in spring, to listen to the chorus sung by awakening life, led by that heavenly choirmaster, the lark. But when filled with desire to perpetuate his work upon paper, will he not be better pleased if the result should prove not merely beautiful, but useful and interesting too ?

H. Ernest Murchison.

NOTES.

THIS, the first number of a new volume of the PHOTOGRAPHIC QUARTERLY, contains a reproduction of a photograph taken by Mr. Alfred Maskell, without a lens, reproduced in photogravure by Mr. Alfred Colls. It will be admitted that the result is a picture having considerable merit. The scene lends itself most admirably to the suppression of the sharp lines which would be apparent had a lens been used. The article upon the subject will be read with much interest, especially as at the present time there are many working pinhole photography. Several examples are to be found in the exhibition at Pall Mall.

The summer season has now passed, and winter work is commencing in good earnest. It consists principally of the preparation of lantern slides for exhibitions, and the compiling and writing of papers, upon matters allied to photography, to be read before the members of photographic societies or contributed to the journals.

Many interesting matters are constantly being brought to the front in connection with the science of photography. Perhaps the most novel is the new printing process by Arthur Green, Charles Cross, and E. J. Bevan. The process was brought under the notice of the members of the British Association, in Section B, at the recent meeting held at Leeds. The full title of the paper is :—" The Action of Light upon the Diazo Compounds of Primuline and Dehydrothiotoluidine : a Method of Photographic Dyeing and Printing." The following extract will go far to show the usefulness of the process :—

" It has been long observed by one of us (Green) that the diazo compound of primuline was very sensitive to the action of light, being readily decomposed thereby, and losing its property of combining with phenols and amines. Upon this fact we have now founded a photographic process, by means of which designs can be produced in fast colours upon cotton, silk, wool, linen, or other fabrics. It can also be applied to wool, xylonite, celluloid, paper, or to gelatine films upon glass—thus affording a very wide range of employment. The process, which is a very simple one, merely depends upon the fact that if a material containing diazotised primuline be exposed to light under a design, those parts which are acted upon by light will be decomposed, whilst the parts protected from the light will remain unaltered, and consequently, on subsequent development with a phenol or amine, will produce colours, whilst the decomposed portions will not. The details will, of course, depend somewhat upon the material to be treated. As an instance, we may take the production of a design upon cotton cloth, cotton velveteen, and so on. The material is first dyed with primuline from a hot bath containing common salt until the required depth is obtained. It is then washed and diazotised by being immersed for a quarter of a minute in a cold bath, containing about $\frac{1}{4}$ per cent. of sodium nitrite, and strongly acidified with sulphuric or hydrochloric acid. The material is washed again, and exposed damp—or, if preferred, after having been dried in the dark—to the action of light beneath leaves, ferns, flowers, or other natural objects, or beneath glass or transparent paper upon which may be painted or printed any design which it is required to copy. Either the arc electric light or daylight may be employed; in the latter case, the time of exposure will, of course, vary with the intensity of the light—under half a minute is required in bright sunshine, and nearly half an hour in very dark, cloudy weather. When the decomposition is complete, which may be readily ascertained by means of a test slip exposed simultaneously, the material is removed from the light, and either passed into the developing bath at once, or is kept in the dark until it is convenient to develop it. The developing bath consists of a weak solution ($\frac{1}{4}$ to $\frac{1}{2}$ per cent.) of a phenol or amine made suitably alkaline or acid, the phenol or amine employed depending upon the colour in which it is required to produce the design, thus:—

For *red*,	an alkaline solution of β-naphthol.
,, *maroon*,	an alkaline solution of β-naphthol-di-sulphonic acid.
,, *yellow*,	an alkaline solution of phenol.
,, *orange*,	an alkaline solution of resorcin.
,, *brown*,	a solution of phenylene diamine hydrochloride.
,, *purple*,	a solution of α-naphthylamine hydrochloride.

If it is required to produce the design in two or more colours, the respective developers, suitably thickened with starch, may be applied locally by means of a brush or pad. After development the material is thoroughly washed, and requires no further fixing.

Specimens of work done upon linen, silk, woollen material, etc., are exhibited at Pall Mall, and it is not too much to say that the "Primuline Process" is the photographic sensation of the hour.

Many exhibitions are being prospected, but happily they are not as numerous as last year, and those which have been advertised promise to be conducted on better lines than heretofore.

The opening of the Exhibition of the Photographic Society of Great Britain is the one occasion which is looked forward to by all sorts and conditions of photographers. Neither time nor space will allow us to more than refer to the Exhibition, and give the names of those to whom medals have been awarded, and some brief mention of their pictures. The judges, elected by ballot by the members, were Captain Abney, Mr. V. Blanchard, Mr. W. England, Mr. J. Gale, and Mr. H. P. Robinson. Mr. Henry Moore, A.R.A., was also elected, but was prevented from attending by indisposition.

The general effect of the room is more harmonious than usual; the hanging appears to be well done, and the pictures well grouped together; this is always a feature of these exhibitions where the exhibits are not divided into classes. The feeling of harmony arises from the general colour of the prints. The cold greys of platinotype and bromide prints are nearly absent, and the agreeable variations of brown, produced by platinum toning and sepia platinotype, prevail, while the silver prints—perhaps 5 per cent. of the whole—have been judiciously kept as much as possible to themselves. Whenever an albumenised print has been placed (by stress of fitting we suppose) among the platinum tones its contrast is most conspicuous, especially if the deep pink variety has been employed.

A few words on the prize pictures and we must conclude. We will take them as they occur in the catalogue.

To Mr. George Davison is awarded a medal for (55) "An Old Farmstead." A large bed or field of seed onions makes a most effective foreground. Beyond the field is a picturesque farmhouse, with clothes hanging to dry—a fine point in the composition; the whole is backed up by a bank of clouds or mist, feebly illuminated at the edges, and the upper part is clear sky. The size of the picture is important, being about 19 × 12, and the whole arrangement makes a very charming picture. It has the one defect, hardly noticed, of telling no story, and depends for its success on treatment, touching which a few words may be interesting. The image is undoubtedly much out of focus, but there appears to be no selective or differential focussing, the definition being moderately but equally diffused over the scene. The focal treatment rather agrees with the often expressed desires of several eminent photographers for diffusion and equalisation of focus, except that it is carried to extreme limits. We have no information as to how the effect is produced. We do not think it is due entirely to the management of the lens—if, indeed, a lens was used—but would venture to suggest that one or more pieces of celluloid film have been introduced in printing between the negative and the paper. Talc was used for this purpose many years ago, but the small size of this material limited its use. The paper being of Whatman's roughest kind helps the effect, the grain giving depth, luminosity, and atmosphere. The sky if not taken direct has certainly been carefully studied from nature, and has been managed with great skill. We hold that in this case the end justifies the means, whatever the means were. The picture altogether is most effective when seen from a distance, and most ingenious when closely examined.

We next come to a group of Mr. Lyddell Sawyer's well-expressed happy thoughts. That selected for the medal is entitled "Two 's Company" (122), and the old, old story is well told. A medal is awarded to a small picture by Mr. J. B. B. Wellington (165), "The Latest News"—a simple subject, two girls reading to a man. Note the fine distribution of light and shade, and the harmonious effect throughout the picture. The lines and masses are in strict agreement with the teachings of orthodox art. Occupying the post of honour in the centre of the end wall is a fine series of six pictures representing the "Feast of Roses," that brilliant festival in the Vale of Cashmere, celebrated by Moore in the "Light of the Harem." Their author, Mr. Shapurji Nusserwanji Bhedwar, to whom a medal has been awarded, is an enthusiastic Indian amateur, who bids fair to make his mark in photography. We have no space here to enter into details of these delightful pictures, which belong to the higher order of subject that calls for invention and imagination as well as execution. It is difficult to hit the exact limit to which such subjects may be carried in photography, and to miss success is to utterly fail. The prints are by Blanchard's platinum process. Mr. Bhedwar is a pupil of Mr. Ralph W. Robinson.

Mr. J. E. Austin shows several good pictures, and gets an award for (221) "The Love Letter," a well-composed group of Whitby fisher-girls. This is a good picture, but we should have preferred the one hanging above it as more original. Mr. Lyonel Clark is medalled for a little gem (232), "Dedham Bridge," whose beauty of composition, mass, and colour overpowers some technical defects. The colour of the print is the most striking feature—a full, rich sepia. We are told that this print is toned with palladium, and intensified with silver. The portraiture is not very striking this year, and the judges were fortunate in finding so fine an example as Mr. R. H. Lord's "Study of Two Children" (330). Mr. Ralph W. Robinson exhibits the concluding portion of his portraits of Royal Academicians and Associates. It has been a great undertaking to photograph in their own homes, and—as we believe he has succeeded in doing in every case—to please such critics as seventy of our greatest painters and sculptors. This year he is awarded a medal for a genre group (332), "The Pedlar." Next follows, of the medalled pictures, Mr. B. G. Wilkinson's "Sand Dunes" (365), and (399) "Bantry Bay," by Mr. Tolley, a pure landscape very delicately treated. A medal is also given to Mr. Byrne's fine portrait of Dr. Sellé (441), and to a very original procession, by Mr. Van der Weyde (600), of last century folk, entitled, "An Invitation to Supper." For variety of pose this picture is a study.

In so short a notice it is, of course, impossible to attempt to criticise the photographs exhibited, and we have only commented briefly upon the medalled pictures. There are many gems of work which prove how carefully photography is now done, and how many of the exhibitors show by their work that they have an eye for the beautiful and much knowledge of composition.

Considerable support is being given to the Exhibition which is to be held in Vienna. Many of the best English amateurs are preparing photographs to be sent out. The committee of selection are to be artists and photographers of repute. We shall watch with interest the work of the Vienna Club of Amateur Photographers, and hope to find their "Photographic Salon" a success.

The celluloid and other films are now to be had absolutely perfect. There has been a tremendous run upon the Eastman transparent rollable film, so much so that it was rumoured that the manufacture was not being proceeded with; but we have it on the best authority that the Company's works at Rochester are kept going night and day, and that the value of the output is something like £1,000 per week.

Silver and platinum salts continue to advance in price. Already the makers of sensitised albumenised paper have advanced their prices; and in view of the steady rise in price it is difficult to see how manufacturers of *cheap* plates will be able to maintain the quality at present prices.

Scientific men are working to produce prints without platinum salts, that shall have the appearance of those obtained by the platinotype process, and the nearest approach that we have seen are on paper supplied by Messrs. John Lewis & Co., of Birmingham, and produced by what is termed the kallitype process.

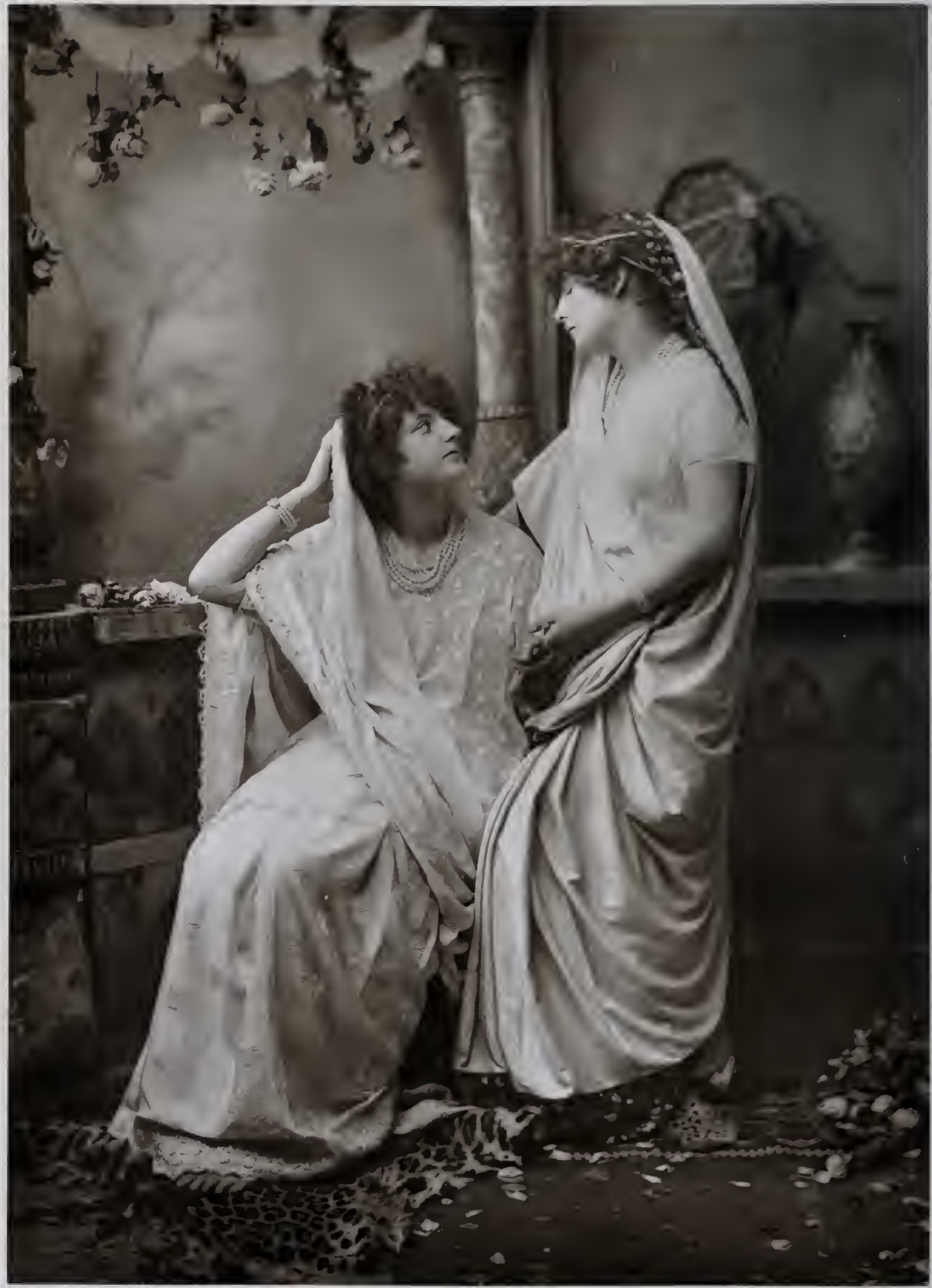
Much interesting and charitable work is being done by members of photographic societies individually and collectively for the entertainment of their poorer neighbours, by giving lectures illustrated with views shown by the optical lantern. The Manchester Amateur Photographic Society are doing a very good work. Lantern shows may be made instructive, entertaining, and amusing; they are always appreciated by young or old, rich or poor, and no greater pleasure can be given to a lecturer or demonstrator than to witness the delight of a crowded audience upon the reproduction on the screen of the beauty spots impressed upon the sensitive plate during many a pleasant trip at home and abroad.

The art of photographic reproduction advances by leaps and bounds, and the chromo-collotype published in the July QUARTERLY has created much sensation. Active minds are at work, and it is within our knowledge that more than one illustrated paper will shortly contain supplement pages of photographic reproductions printed in colour, which will equal, if not surpass, chromo-lithography. Mr. F. Bligh Bond has, we understand, done much work during the last three months, and has proved to his own satisfaction and that of others, that his process of making plates sensitive to certain rays of the spectrum is the right one.

Instantaneous photography cannot be said to be artistic, but just recently Mr. Louis Meldon has produced a most admirable photograph of a "Cycle Race," taken in the $\frac{1}{500}$th of a second; and just as we are writing we have received a photograph from Mr. James Lyon, M.A., which he titles "How Surefoot won the Two Thousand," really a masterpiece of instantaneous work. Two horses are going at a full gallop, and the peculiarities of motion so clearly pointed out by Professor Muybridge in his lectures are distinctly visible—notably that a horse always has one foot on the ground whatever pace he may be going, and also never puts out his fore leg farther than his nose. In the photograph before us these points are most clear.

The council of the Geological Society are anxious to obtain photographs interesting to those studying geology. This work opens up a fine field for those who, perhaps would never be art photographers as the term is now interpreted, but who yet may be wishful to add their quota of help to advance photography and its practical application to matters of importance to all.

Since the last number of the QUARTERLY was published, the *Photographic Reporter*, a monthly magazine, has been entirely remodelled, and in addition to many other subjects it contains a most exhaustive summary of photographic events. We therefore commend it to all interested in photography. In addition, it is well illustrated, contains original articles upon photographs, criticisms of photographs, papers and abstracts of papers read before photographic societies, and much general news.



"CONFIDENCES."
BY SHAPOOR N. BHEDWARD.
(Selected from the series of photographs illustrating the "Feast of Roses" exhibited at the Photographic Society's Exhibition, 1890.)

THE

PHOTOGRAPHIC QUARTERLY.

EDITED BY

CHARLES W. HASTINGS.

(Editor of "Amateur Photographer, "Photographic Reporter," &c.)

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ORIGINALITY: A TALK IN A STUDIO.

Wilson. Good evening, Ransom. Still studying the catalogue? What did you think of the exhibition?

Ransom. I never saw so many new things that were not original.

Wilson. Is not that a distinction without a difference?

Ransom. Perhaps so. Everything new should, strictly speaking, be original. It ought not, for instance, to be necessary to advertise a "new *and* original" play, as is often done, for this seems to suggest that the words have two distinct meanings; and indeed, when examined closely, there *is* a shade of difference between them. "New" in its meaning, is much more limited than "original." New means something lately made, while original means something more, and applies, in my mind, to thoughts, or uncommon combinations of thought. It is not necessary that these thoughts should be in words; they may be embodied in other ways, such as in pictures, or inventions, or even in music, although I never knew two interpreters of musical thought to agree.

Wilson. No. Music is not a very definite language, and puzzles the translators. We moderns are not original in asking for novelty. When, two thousand years ago, the Athenians clamoured for "something new" they asked for what was, in the strict sense of the term, impossible, although the world was younger then, for the new is only a combination of the old.

But to speak strictly is to speak pedantically, which we will avoid if possible. We echo and intensify the cry of the Athenians now, but are content to accept something short of total newness. With the dwellers on the threshold of the twentieth century a gentle touch of novelty is often exalted into a new fashion.

Ransom. This "something new," which not even Solomon could find under the sun, with all his wisdom, all his treasures, all his seven hundred wives—and others!

Wilson. Ah, he must have been difficult to please. It has been put forward as a possibility that there was a time when the statement that two and two made four was a startling novelty, and had to be proved. This must have been as early as the Pleistocene at the latest. At that time a man had a chance of being original; all the good things had not been said; the last camera invented; and all possible developers had not been introduced. "Then," as has been wisely said, "*then* a man's thoughts were his own, his own by the best of all rights—creation; *now* they are the bastard product of ten thousand buried men's dead ideas." We have to be content to patent the same thing, with a slight shuffle, over and over again, not only in the official patent office but in our everyday life.

Ransom. When Solomon said there is nothing new under the sun, he spoke strictly scientific fact, but if he meant on this earth, he was strictly scientifically wrong, for we do get an addition in the shape of meteors and meteoric dust continually.

Wilson. Ah, but this proverbially wise monarch would have argued that something that came every year could scarcely be called new.

Ransom. Then I give it up, and agree that what we call new is simply a re-arrangement of old materials. Yet, surely, if I put together two atoms that have never been joined before I produce a new thing?

Wilson. Well, yes, I must admit that. But we are considering too curiously. After all does it matter? As R. L. Stevenson has lately said to an interviewer, "We all, idealists and realists alike, rearrange that matter of observed life with which our memories are charged, and the most we can mean by the word invention is some happy congruity or surprise in the method of arranging it."

Ransom. That is true enough. Really great men never claim to be original, nor do they hide that they get their inspiration from pre-existing knowledge. A thing is made again every time a man of genius uses it. Homer was an original poet, but the foundation of his verses was legendary and traditional. Chaucer told old tales. What matter? Did not even Shakespeare himself, the head and front of all originality, found his plays on old stories and traditional histories? He even boldly veneered the compositions of others into his own work, and with a touch made them his own. But, as Dryden said of Ben Jonson, "he has done his robberies so openly that one may see he fears not to be taxed by any law. He invades authors like a monarch, and what would be theft in other poets is only victory in him."

Wilson. We don't do it so openly now. Anyhow, it is only done by big men or very small ones. It is delightful to see how genius can transmute common metal into gold, of which in our day Tennyson has given us the best examples. Had you ever the curiosity to read the "Idylls" side by side with the "Mort d'Arthure"? You will there find many instances.

Ransom. Can you quote one?

Wilson. It is difficult to quote right off, but here is one. In the "Elaine," when Lavaine draws the spear-head out of Lancelot's wound,—

> "That other gave
> A marvellous great shriek and ghastly groan,
> And half his blood burst forth, and down he sank
> For the pure pain, and wholly swoon'd away."

Now, if you turn to old Mallory's "La Mort d'Arthure," you will find the incident thus described:—"And Sir Launcelot gave a great shricke and a mervailous ghastly grone, and his blood brast out nigh a pint at once, that at the last hee sanke downe upon his buttocks and sowned paile and deadly." There is a naturalistic plainness about the old writer. He calls a spade a spade, and is not without directness and pathos; but observe how the art of the poet-lord transmutes his coarse material into poetry.

Ransom. And what Tennyson has done with the old writer the painter and photographer must do with Nature if he would be an artist. We hear a great deal of talk of Nature by those who appear to know very little about her. It is part of the artistic jargon of the time. Nature may be a poem, but the artist must set it to music; he must add the melody of Art to the libretto of Nature; he must omit, and add, and vary to suit the rhythm of his music.

Wilson. Then it is better to frankly recognise the fact that originality in the strict sense of the word is not only difficult but impossible, and to turn our attention to doing our best with the old materials?

Ransom. Yes; and by using old material I mean that we may profit by the experience of those who have gone before—not, however, by slavish imitation or by adopting their mistakes. Imitation is the death of originality, if, indeed, a thing that does not exist can be said to be killed. Let me impress this most certain fact on you. No art ever succeeded that imitated other methods of art. And that will be the salvation of the English School of Painting. The imitation of French art is endangering our chance of having a school of our own; but history will repeat itself, as usual. The good in the imitation will live, and the rest go out of fashion, as all affectations do.

Wilson. Imitation in any style is never vital. It is always wanting in the sincerity, feeling, and inspiration of the original.

Ransom. The lack of originality in photographs is wonderful. Practice seems, as a rule, to consist either, with those who aim at pictorial results, in the imitation of those who struggle for novelty when that imitation is easy, or, with the mass of photographers, in heedless attempts which would have no pretension to pictorial qualities, except when they are sent to exhibitions to compete for pictorial prizes. The usual attempt at improvement is to ask for the name of the lens, plate, and paper that contributed to successful pictorial results, instead of taking a dose of Burnet on the one hand, or Emerson on the other. Which reminds me, by-the-way, that we had not many strictly naturalistic pictures in the exhibition.

Wilson. I studied every picture, and found a few that I thought would answer the description, and some others with like tendencies. I think we owe Dr. Emerson a debt of gratitude, or certainly more credit than we give him, for this development. We may not follow him or adopt his ideas wholesale; but, at all events, he has given us something to think of, and we are told there are "books in the running brooks, and good in everything." If he would only see this in others, and put it a little more mildly, all would be well.

Ransom. This is another example of want of originality with which I have little fault to find. Naturalism is imitated from a method of painting which is imitated from the French, who evolved it from our own Constable. We must all admit evolution; but perhaps this particular instance lost its way in its descent. Any way, it would be a good thing if some of our present young men could "throw back" to their reputed ancestor, who *could* compose a picture as well as paint it. It is a pity the descent did not stop at paint. The camera may be a faithful copyist, but there is no reason why we should be direct imitators. Still, I have no doubt good will come of it. The two styles will check or absorb each other, and a better kind of pictorial photograph may be the result.

Wilson. In short, eccentricity may have its uses; and, as I have just quoted, there is good in everything.

Ransom. No doubt. Yet it must be owned that the struggle for originality is sometimes positively harmful, and in art has been the cause of aberration in more senses than one. I speak only of the painters now. This struggle to be conspicuous at any price has intensified at last among some of the young second-hand geniuses to such an extent that otherwise sane men, finding they could not get out of the ruck in the ordinary legitimate way, have not scrupled to put on the cap and bells of art so that they may strut their hour in front of their little booth in Vanity Fair. The idle public look on so that they may have something fresh to laugh at and talk over; but the fashion soon wanes, the lookers-on are content with a glance at the outside show, and do not accept the invitation to "walk up." In other words, the impressionist and naturalistic painters find their works won't sell, and that they cannot live on their own eccentricity.

Wilson. I now see positive objections to originality. You cannot succeed without going off your balance, and then you are all wrong.

Ransom. It would be most original to talk a language of your own; one quite innocent of such a worn-out, old-world thing as grammar. Now the so-called naturalistic and impressionist painters do not talk a new language, for they did not invent painting, but they have dropped the grammar and talk an infantile babble of their own. This is why they have become a one-ideaed race, and go for little more than values only. They have not let themselves words enough to express any more.

Wilson. Why do you say "so-called" naturalistics?

Ransom. Because with few exceptions their works have very little relation to Nature from which they derive their name. They are not consistent. They declaim against conventionalism; yet there never was anything in art more conventional than naturalism as at present practised. I don't blame them for that, for all art is more or less conventional, but it is an impertinence to Nature to take her revered name in vain, and apply it to their caricatures of her. To give the name of Nature to a ridiculous method which libels her smacks of impiety. Yet I must confess there is humour in it, perhaps the only bit of humour of which they have been guilty. Much as they have been the cause of fun in others, they have very little fun in themselves. Is it not Tom Hood who says, "The man who has no sense of humour has no sense at all"? All reference to nature they seem to cram into their talk, and leave none for their work. They do not appear to have acquired the art of observing Nature. Summer, Autumn, Winter, Spring, in their works are all tarred with the same brush—a midnight gloom, an abiding melancholy.

Wilson. That is where the poetry comes in. They strongly object to being moral or didactic; or, in fact, to say anything, but they must have poetry. Now poetry with some mistaken people means melancholy, and melancholy only, so they put a dash of it over everything.

Ransom. Ah, well! If they are satisfied I am delighted. The children must play. Let the world wag. We will return to our subject.

Wilson. Which we have worn threadbare.

Ransom. Not quite. Let us see where we are, and to what conclusions we come. I think we agree that it is not possible to be original to the full extent of the word; that if we attempt it we run the risk of being more ridiculous than meritorious; that we may take advantage of the wisdom of our forefathers as well as their mistakes; that the combination of old materials, so that slavish imitation is avoided, is sufficient for art purposes; that it is not possible in these our days to throw over all the learning and experience of the past and "start fresh;" and to say that others have no "message" is not to prove you have one yourself.

Wilson. To all which I devoutly agree. Nevertheless and notwithstanding, I often think I see something new.

Ransom. And so do I; and I once paid for the sight, as you shall hear. During the rinking mania I invented a pair of skates, very different to the hundreds of the time, and patented them. Skilled skaters were delighted with them. I had the patent records searched for years to make sure I had not been forestalled. I then made a contract to supply them to a great institution, and they seemed likely to supersede all others. This induced interested persons to search further than my agents thought necessary; and they discovered, to their surprise as well as mine, that my skate had been invented and forgotten as long ago as 1823. Now, you may as well suspect a nigger in the tropics of inventing and using a skate as that one should have been invented as early as 1823, and that it should be exactly like mine. Yet this took all the originality out of my invention, and my patent was worthless. Do you see how this applies to art?

Wilson. The moral certainty lies in the application thereof. You mentioned the artistic jargon of the time. Can you give me the theory of the school in their own language?

Ransom. Nothing easier. Art is the representation of the indefinite combination of heterogeneous and simultaneous appearances in correspondence with external co-existences and sequences.

Wilson. Now you make all things clear to me. Good-night.

Ransom. Stay! I have just thought of something new.

Wilson. Well?

Ransom. From Tennyson:

"The latest seed of Time,
New men, that in the flying of a wheel
Cry down the past."

Wilson. Don't be frivolous.

H. P. ROBINSON.

RATIONALISTIC FOCUSSING.

AMONG the various theories offered us as explanatory of the nature and appearance of those phenomena which, for want of a better name, we call "shooting stars," is a theory which would have us believe that these appearances are caused by bodies, small in themselves, passing through the outer zones of our atmosphere with a velocity so great that the atmospheric friction brings them to a state of incandescence, and finally, evanescence. There has recently been seen a shooting star (otherwise called "The Focus Question"), the passage of which through our mental atmosphere has been attended by very considerable friction, not to say incandescence; and we can assuredly assert that it is a "burning question." Nay rather, may we not say, that there are two volcanoes which, now and again, answer each other with "fiery flames and fury"? Still the hope lingers on that, ere long, they may be burnt out and idle, while we, who may survive them, shall by that time have found between them a "peaceful valley," deriving warmth from both our sheltering, hollow cones, yet being no longer scorched by either.

This burning question of "to focus or not to focus" has been discussed exhaustively from the art side and from the scientific side, in each case much to the exclusion of the other, with the result that might very readily have been anticipated—viz., of leaving matters very much *in status quo ante.* The relation of science and art is in many ways comparable with the inter-relation of science and religion. In this latter case Mr. Gladstone* has recently and most ably shown that an expert, on the one side or the other, is by no means the best qualified or most likely person to form an equitable judgment. Any one who has devoted his thoughts exclusively, or chiefly, to one particular subject must, consciously or unconsciously, have a bias in the direction towards which he has some preconceived ideas; and will weigh, with varying balance, the evidence in favour of his own pet theory, and that which tells against him. A specialist, of necessity, has some measure of personal equation. He who devotes his undivided energies to the study—say of beetles—may well echo, "Kings may come and nations may go; but my beetles go on for ever."

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* *Good Words*, April 1890.

For my own part I have neither the inclination nor ability to become a specialist, but am content to share modestly in the fruits of the specialised labour of others, passing from tree to tree, lest by continuously and exclusively feeding on the luscious lotus, my taste becomes dulled, my palate cloyed, and I sink into the land of dreams.

In most mundane affairs there is a *via media*, a middle course, which, if by some stigmatised with a cry of "mediocrity," may yet be held to have a considerable chance of combining some of the desirable features of each extreme without, of necessity, including the detrimentals of either.

Such middle course, while having greater latitude of action than that possible to those tied down to either extreme, need not tend to loss of individual character, "provided always" that, in all cases, it is endeavoured to make *rationalism* the base line for each operation.

It will simplify matters if the application of this proposal is approached in what, at first sight, may appear to be a circuitous course.

I take it for granted that, in general, among other things, the object of a work of art, more especially a picture, is to convey ideas. I do not maintain, hereby, that these ideas are, of necessity, educational or instructive. I am content to admit that those things which appeal to our art perceptions are in part sensuous; but I find it difficult to imagine that any work of art can be devoid of this power of conveying ideas.

The picture speaks through the eye, as the words of a book speak through the ear. Books, as we all know, vary through an immense range, from those of the highest intellectual order to the merest frothy verbiage, which at best barely tickles the ear. Those books which all men have set store by are, for the most part, not found close to either of these extremes. Those we value most, those we think have best fulfilled their purpose, are those which take a theme,—"a story, a song, or a sermon,"—and around it arrange their subordinate parts in such a manner that each part is contributory to the harmony of, *i.e.*, in proportion with, the whole. Where there is not this subordination there is either chaos or flatness; there are either too many points of accentuation, or there are none:—comparable to dining off pickles *or* dry bread in fact.

Now, to carry our ideas into the region of pictures. A picture should have, as a general rule, some one leading theme (at times there may be more than one); around this theme there will be parts which hinder or help; they will either add or detract from the theme to which we anchor our chief interest.

The painter has many devices for altering the *relative* importance of his composing parts. Some of these are denied the photographer. One, however, he has, which is generally much under control—viz., the sharpness, or *degree of focus*, with which a certain part of his subject shall be rendered.

For the present we may leave out all other factors, and consider only this *degree of focus*, as applied to the principle of *subordination of interest.*

Suppose, for instance, you are in a train, which is passing rapidly through a station. On the platform you hope to see a friend. As the train spins through the station you see a patchwork of human faces, only one of which you see clearly and distinctly. You exchange a nod with your friend, and only the image of your friend's face distinctly remains, surrounded by the sea of scarcely recognised objects. Here you have *one strong point of accentuation*, and little or nothing in the way of subordinate parts.

Again, you pass through the station a week later, after hearing your friend is married. You are now chiefly interested to see "what sort of a person" he has married. For a moment you recognise your friend's kindly smile; but it is on the face next his that you concentrate your attention. Your interest is now *divided* chiefly into two, but *not equal*, parts.

Again, you are passing through the station (this time in a somewhat slower train) in the little country village where you passed many years of your now long-past childhood. You see the little wayside inn, the clump of trees, etc., much the same as you dimly remember them. The old one-legged porter is still there, the rector and his wife, both older, a little stouter maybe, but the same kindly faces; and beside them a rather tall lady. Can that be the "little Ethel" whose curls you so admired years ago, when the golden sunbeams fell on them through the coloured windows of the church, in which the dear old rector gave sermons, long and learned? The same face, with so many years added! All you have seen falls into the background, some parts more, others less indistinct and secondary. For the moment that central figure is what you have seen, and only seen sharply, clearly, distinctly, *in focus.* Your train carries you moderately quickly, but yet there is time for you to see every line and feature of that face; other parts you have certainly seen clearly and distinctly, but not equally distinctly. There is no *doubt* that it was the same rector and his wife, nay more, you noted that they were aged somewhat; but although there was nothing in the picture that you failed to recognise and identify, yet the group claimed the lion's share of your attention; and in the group one figure claimed the lion's share again of the group.

Why, then, did you see the one face more distinctly than any other part? Readily enough you find answer in the word *interest.* It was that which interested you, and therefore your attention was focussed on that (to you) chief point.

As you pass on a few miles and close your eyes the scene revives; the picture in your mind is a replica of what you saw—

viz., various parts in relative degrees of distinctness. Nothing that your eye *saw* was unrecognised, but there was an ascending scale of distinctness proportionate to the interest (mental concentration) attaching to each part.

May we not then say that there is an intimate relation, a connected proportion, between interest and degree of distinctness ? Is it any matter of surprise that your eyes see the most distinctly those parts which your mind most strongly wishes to see ?

And again, according to the very great variety of chief subjects and surroundings, there must be a great range of scale in relative interest.

Now, your chief theme is a dainty little country maid trying to see the reflection of her bonnie face in the pail of water she has just drawn from the well; her surroundings are ugly enough, and you care nought for them. The area of your interest is her face, and you feel more than half disposed to peep over her shoulder. Now, your interest is a group of children on the village-green, half playing, half teasing the blear-eyed donkey. Boys and donkey are dividing your interest. And now, further down the lane, you catch sight of the old miller and his wife in their tidy garden next their ivy-covered house, and close by stands the mill, too, with its old, many-times-mended, under-shot wheel. All the parts of the picture seem to fit into each other like bits of dissected puzzle. The eye wanders round and round the buildings and garden, with the old couple strolling about; it even wanders part of the way down the road, but returns again, and again wanders up the mill stream for a while, to return once again to the quaint old mill and surroundings. Every stone seems to have grown old and grey (with a separate individuality), each with a character all its own.

As you are attracted by this quaint old remnant of a monastery you wander nearer and nearer, until presently the old man sees you are a stranger, and invites you to step into his garden and look at a fine Norman doorway rich in mouldings, lozenge, nail head chain, pellet, etc., and above it a niche of later date, with enrichments of still later date ; higher up still the base moulding of a window, etc.

Among these works of man's hand are scores of flourishing tufts, wall rue,* and other ferns, every frond a study of form in graceful line, the old and the new intermingling in a profusion of detail.

The curves of the time-worn mouldings and of the fronds are a contrast, but yet in harmony. Their curves invited further and further inspection.

So, surely, is it all the world over—ever-changing scenes and *endless degrees of relative interest.*

May we not, I ask, meet this, in part, at any rate, by our method of treatment ? Is there not logical and rational basis for endeavouring to preserve *the proportion of interest and precision of detail?*

Remembering the old saw that " a wise man may often learn from a fool," without putting myself in the place of the wise man, I will yet make bold to ask those who have not already foreclosed the issue, to cast aside, as much as may be, any bias, and weigh this suggestion in a fair balance.

Having then formulated a tentative principle—viz., that " Degree of definition varies as relative interest "—it yet remains to confess that there are other factors to be reckoned for.

Most of us hold a small picture somewhat nearer the eye than one of larger size. Furthermore, it is a matter of general experience that a picture which is full of minute detail, even if of somewhat large size, is generally held nearer the eye than one not so rich in detail, and that such a picture, when viewed at a distance, is frequently somewhat bewildering. Thus, the *size* of the picture, and the *distance* at which it is intended to be examined, must not be lost sight of. The *grain* of the printing paper again is a factor.

Two other considerations demand remark.

Firstly, the foreground of the picture is, in general, the door of the picture. The eye enters the picture by an imaginary passage along the foreground. Now, the relative importance of the foreground to the theme, whatever it may be, will determine its relative emphasis in its rendering.

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* Asplenium Ruta-muraria.

There is no reason why the theme should not be situated in the foreground, or, on the other hand, it may be of very little importance (interest); but in whatever degree it assists in "advancing the story" in that same degree should it make its existence recognised. But if there is no good reason for including that particular foreground, or still worse, if the foreground *detracts* from the theme, and impedes the story, by its very ugliness, or through some counter-attraction, then there is a reason for our asserting, that, wherever possible, some other foreground should have been selected, seeing that, as a rule, we have more control over the foreground than all the rest of the picture put together. To put the matter briefly, we may suggest that "the foreground should not be offensive or distracting."

Secondly, it is stoutly maintained by some that the element of mystery is (if not essential) of the greatest importance. In this connection the term "mystery" is used in two slightly different senses. For instance, in one of our above scenes, a cottage door stands open. We see an old man reclining on a settle. There is no doubt about its being a *man* and a *settle*, but we do not see the finer lines of his figure. We are conscious that there is rude carving, too, on the settle, perhaps well worth our looking at; but we cannot see more than the chief indications.

Interest is stirred; there is more to be seen than we can see. What we can see is intelligible as far as it goes, but we want to go *further*, see *more*.

There is another kind of mystery which partakes largely of the nature of confusion. I have in mind a well-known and highly valued painting, attributed to Paolo Veronese, in which are two figures, one standing, the other reclining on the ground, with certain draperies, etc. Some feet are visible, but to which of these figures one of these feet belongs is a matter I have heard stoutly disputed. Such mystery of confusion is *not* generally desirable.

I have seen photographs (some of which I may as well confess at once to having produced myself) in which certain parts are so very much "out of focus" as to be scarcely within the pale of intelligible recognition. Rounded stones on the beach are like balls of cotton wool; trees, in which the foliage is represented by star-like blots; tufts of grass somewhat resembling an inverted bunch of prize carrots; sheep in the middle distance scarcely to be distinguished from the bits of rock among which they are grazing; still further in the distance, a something which may be interpreted as either a tree, a house, or a haystack, "according to the taste and fancy" of the spectator.

Thus there is a difference between subduing and suppressing detail, and rendering or destroying it by an irritating confusion. Manifestly, then, where an unimportant part of a picture is rendered so confusedly as to stimulate inquiry and wonder, the theme must suffer in proportion. A pimple on the tip of a man's nose may be so offensively prominent that it outgrows the man; and we can only think of it as a pimple with a man behind it, in attendance, at it were, as a background.

Finally, it may be said that this is nothing more than differential focussing. To this I can only reply, "A rose by another name," etc. Call it what you will, to me it seems to be acting on a rational basis. But what about limits? Again I say each case must determine its own limits; the "certain amount of softness" may also be called a very *uncertain* amount, seeing that what meets one case will not meet all. There is not, there cannot be, any panacea in art (or anything else); the nearest approach to it being that "imponderable substance" by cruel satire called *common* sense. But, as to limits ("there is a limit at which forbearance ceases to be a virtue," said Burke), reason again assigns us the indications of a boundary; for, surely, where there is such degree of confusion that intelligence is baffled, we may well ask the question, "If this thing is not to be understood why is it put before us?" or else we may take refuge in the pitiful humour of the artist who sets us a puzzle, saying, "find the man," or "find the interpretation thereof."

In this, as in all other such matters, one may safely take Hamlet's advice when he says:

> "Let your own discretion be your tutor . . . with this special observance, that you o'erstep not the modesty of Nature; for anything so overdone . . . though it make the unskilful laugh, cannot but make the judicious grieve."

But yet once again let us hear the echo of the wise words of:—

Polonius. "This above all:—To thine own self be true;
And it must follow, as the night the day,
Thou canst not then be false to any man.
Farewell; my blessing season this in thee.
Laertes. Most humbly do I take my leave."

F. C. Lambert.

GEOLOGICAL PHOTOGRAPHY.

AT its meeting in Newcastle in 1889, the British Association for the Advancement of Science, recognising the valuable aid which photography had given, and could give, to the systematic study of geology, appointed a committee "for the collection, preservation, and systematic registration of photographs of geological interest in the United Kingdom." At the Leeds meeting last year, this committee was able to send in a report and exhibit a collection of about three hundred geological photographs, as indicative of its year's work, and as an earnest of its ultimate aim—the getting together of a national collection of photographs illustrating the geology of our own country.

The Natural History and Scientific Societies of the kingdom have already been asked to assist the work by forming committees of their photographing members, but the photographic societies might also render great assistance by adopting the same course with their geological members. I say *geological* members, because it is necessary in most cases, if the photograph is to be of real value, that the photographer should either be a geologist himself or working under a skilled geologist's direction, and because the ordinary photographer would not "waste a plate" on a "section" which had no artistic beauty. He would not object to a flight of pterodactyles caught on the wing, or to a picturesque group of "toothed birds" feeding, with a Cretaceous landscape for a background; but the most charming of unconformities and the sweetest of faults would appeal to him in vain; or if the appeal were not in vain, from lack of technical knowledge he would probably produce an excellent photograph of no geological value: he would contrive to take his view so that the dry bones of Mother Earth might be clothed artistically and her *faults* charitably hidden.

For the photo-geologist there is much to be done in the securing of good photographs of such geological features as are liable to more or less rapid destruction. Railway and other enterprises are continually opening up new sections whose important features vegetation and disintegration are as continually veiling; interesting erratic blocks and boulders disappear yearly; moraine mounds, glacial groovings, perched blocks, *roches moutonnés*, are, in many places, fast falling victims to those natural agents whose cry is ever, "*Delenda est terra*," and more speedily to that sometimes unnatural agent, mankind. As from the land there goes up

> "The sound of streams that swift or slow
> Draw down Æonian hills,

so by the shore the "moanings of the homeless sea" tell of the destruction that is overtaking coast-line and cliff, pinnacle and promontory. If a photographic coast survey had been possible when Reculvers was a mile distant from the sea, when Dunwich was a considerable seaport, when Auburn, Hartburn, and Hyde were names of something more populous than sandbanks, and Ravenspur was a rival to Hull, how we should value these photographs now!

Again, there are many typical sections and features of which photographs are wanted. A panoramic view of an old "plain of marine denudation" is, no doubt, an impossibility, but there are plenty of conspicuous instances of marine erosion round our coasts which can be photographically recorded; typical examples of faults, unconformities, anticlinal and synclinal, contorted strata, dykes, interbedded flows, raised beaches, etc., etc., can be collected; though the representation of some of these phenomena suffers from the cruel accuracy of the lens, and, for educational purposes, at all events, when they cannot be seen *in situ*, they are best seen delineated with the kindly inaccuracy of the diagramist, still there can be little doubt that, ere long, direct reproductions of photographs will find a larger space allotted to them in our geological text-books. In fact, one of the points under the consideration of the British Association committee is the possibility of issuing eventually an atlas of selected typical photographs to illustrate the more important of geological phenomena for educational purposes.

For a geological photograph to have the full value of a useful and lasting record, it is essential that it should, as I have said above, be taken under the direction of a skilled geologist. Moreover, the name and position of the section or locality should be given, its special features being also indicated by accompanying description and diagram. Careful measurements and dimensions should be recorded (the human stature scale is useful in a general way, but more accuracy is required), and, in many cases, compass direction is of importance: the date and some indication of light conditions should be added. As to size, no doubt a "whole-plate" is preferable; and where the sections and features are easily accessible, this, or a larger size, should be used. But the working geologist, who is often on the tramp all day, and has to contend with many "ups and downs," does not want to add the weight of a large camera and its accessories to his hammer, his maps, his bag of specimens and his lunch. In these days of hand cameras and bromide enlargements, however, the way is made easy for him; he can carry a hand camera wherever his hammer leads him, or his companion can be prevailed upon to carry it for him, and I have found that not unfrequently an enlargement from a quarter-plate negative has turned out to be of more geological value than a direct whole-plate of the same section, though, considered as a photograph, it was quite inferior. In August I had my hand camera with me while working among the "Sandpipes" in the classic pit at Lenham, and the 18 by 15 enlargements of my quarter-plate negatives made me wistfully desire that I could have carried a hand camera there ten years ago when some most remarkable sandpipes were being exposed, only to be quarried away again at once. The work of the hand camera will not, of course, take the place of sketches and diagrams in the note-book, but it is a very useful addition to these; moreover, first-rate and most accurate diagrams for lecture purposes can be traced with the help of the negatives so obtained and the enlarging lantern, when, as often happens, a diagram will explain matters better than an enlarged photograph.

In addition to the classes of photographs I have mentioned or hinted at above, and to the more technical ones of typical hand specimens and microscopic sections, there is a good deal to be done in the photographing of broader and more extensive features, such as typical river valleys and instances of the work of denuding agents on the grander scale. Here again the geologist and the photographer would assuredly select different points of view, and it is very necessary that they should be combined or work together.

Finally, with regard to printing processes, it is obvious that if the photograph is to be of value hereafter and perpetuate what Nature and man swiftly or slowly destroy, it must be printed by the most permanent process obtainable. The purgatory of the geologist might well be papered with hopelessly faded prints of Silurian scenery and Liassic landscapes to bring home to him the sadness of "it might have been!"

ARTHUR S. REID.

ARTISTIC PHOTOGRAPHY.

NOT so very long ago the above heading would have been treated with derision in artistic circles. But this is rapidly being changed. Artists must look to it; say what they will about selection, idealism, and expression, the photography of the new or impressionist school, and in the near future too, will run them close in monotone pictures at all events; and suppose we achieve colour, what then?

It is a singular thing that for the last forty or fifty years photography, artistically speaking, has been almost stationary, and while immense advances have been made in chemicals, lenses, and all material appliances, art and artistic feeling have been conspicuously absent. The ordinary photographs of thirty years ago were as good (some think better) than the ordinary photographs of to-day. Look at any collection and see.

With the exception of Mrs. Cameron's studies, which were the product of great artistic feeling and an original method, there is little of art to be seen in the past history of photography. There are three chief causes for this: excessive or obtrusive detail, want of atmosphere, and the want of artistic education and feeling so generally prevalent. The childhood of photography, and it has been a long one, is, however, passing away; on every side artists and educated people are working with hand and other cameras, and are astonished to find latent capabilities which they never dreamt of in the much-despised photography.

We propose in the following paper to dwell shortly on the above-mentioned defects of photography as an art process, and to point out some of the methods now being tried for their removal.

1. *Obtrusive Detail.*—This is what so delighted us in the early

times; it was all there, every stick and stone, down to the high light in a fly's eye. Independently of art or picture making, the result often is marvellously beautiful; look at the texture of rocks and fabrics of all kinds, the exquisite drawing of all natural objects, such as delicate grasses, ripple marks on sand,—almost the bloom if not the colour of flowers can be caught; think of the delicate representation of the higher clouds, and the fall and wash of ocean waves. No human work can approach this. Well might Mr. Ruskin say, speaking of monotint work, "The perfection of work would be tinted shadow, like photography without any obscurity or exaggerated darkness."

And all this beauty is produced by the very perfection of the lens; in fact, photography suffers from "the defects of its virtues." It is too good; it tells us too much. The Pre-Raphaelites made the same mistake, and in trying to reproduce all the details of a subject defeated their own aims. How then are we to get rid of this superfluous detail in photography? Several methods have been suggested: the simplest of them is Mrs. Cameron's plan of not using the lens at its sharpest focus,—very beautiful effects may be obtained in landscapes by this method; another plan is what is called pinhole photography, or the suppression of the lens altogether, and on this subject there is an exhaustive article by Mr. Maskell in our last number. A third plan is reversing the negative in printing, or printing through ground glass or tissue paper: we give (Fig. I.) a specimen of a print from a negative in close contact, and (Fig. II.) one from the same negative printed through three sheets of thin tissue paper. Very soft and beautiful effects may be produced by these methods, and the atmosphere of nature suggested. The result obtained is sometimes not unlike the best French monotone pictures, or the first blot or lay-in of a picture, which often suggests more of nature than the finished work.

With all these methods, however, the difficulties of selection and composition remain, and these are only to be overcome partially by careful thought and study of the work of the great masters. Instead of taking so many pictures, how much better it would be to take a few carefully considered ones; the subject should be thought over and visited at all lights, and a sketch of it would be of great use in deciding what to take in and leave out. Another useful plan is to study the subject in a Claude glass; those who have never used one will be surprised and delighted at the beauties it reveals.

2. *Want of Atmosphere.*—This arises chiefly from the inability of photography to render the true scale of light and shade; as Mr. Hamerton says, it is "unable to make those sub-divisions in the scale which are necessary to attain relative truth."

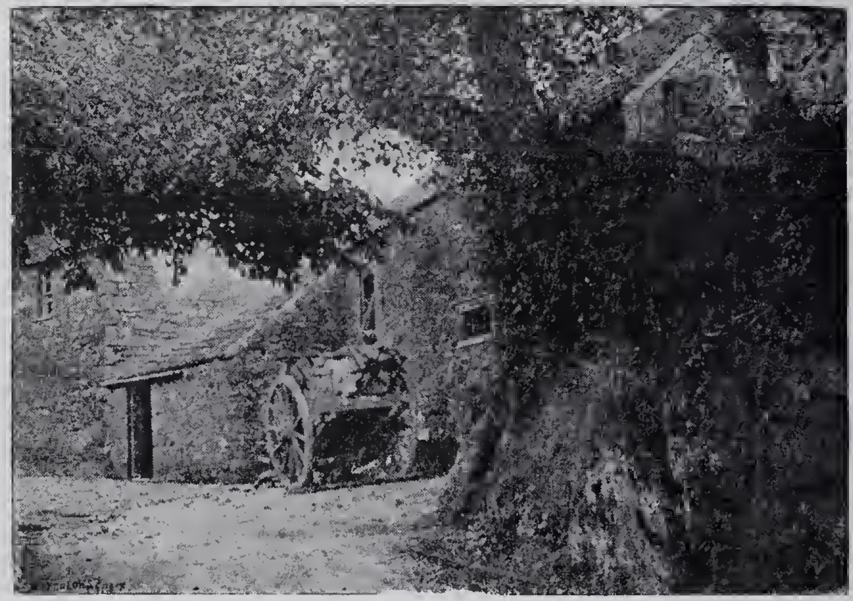

Fig. I.

Now the effects of light and atmosphere are the most beautiful things in nature, and are the aim and despair of all artists worthy of the name. They are the very poetry of landscape; as Mr. Leslie well says, "Rocks, trees, mountains, plains, and waters are the features of landscape, *but its expression is from above*,—hence the paramount importance of the sky in landscape." And here much is to be learnt from observing the practice of good painters: Turner and Constable were always studying the sky—"going out skying," the latter calls it, and the photographer should do likewise.

Every landscape should have its appropriate sky,—it is the keynote of the picture. In Mr. Robinson's works on Artistic Photography will be found some admirable remarks about skies, and how to obtain them, and print them when obtained.

The great difficulty is so to moderate the actinic power of the sun as to get the sky and the landscape both fairly represented; the sun is a treacherous ally,—while he is painting in our foreground he quietly rubs out the sky, and the result is vacuity.

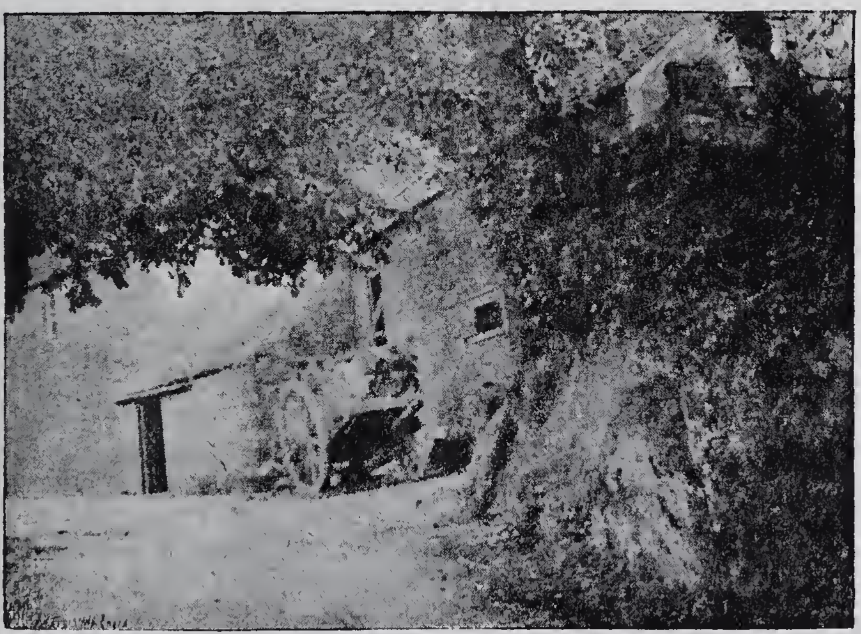

Fig. II.

Here too we may learn of artists, who always prefer the morning or evening effects; then it is that the landscape assumes breadth and repose, and unnecessary details are hidden in the advancing shadows.

Not to speak of the magnificence of sunset and sunrise, how beautiful is the repose of twilight, when a deep calm settles down on sea and shore. This is the best time for landscape photography, the hour just after the sun has set; of course longer exposure is required, but the most beautiful and poetical effects may be obtained. A dull day too, if not too dark, is admirable, and much better than the glare of sunlight, as the most tender half-tones can be secured. But to get these effects a photographer must be an enthusiast as well as an artist; he must learn to watch and wait, and to count his failures as gain if he gets even a little nearer to his ideal.

Corot, the great French painter, used to get up at three o'clock in the morning; and see how beautiful his pictures are, how redolent of the dawn. After all, it is a question of artistic feeling, and it is a great mistake to suppose that without this you can produce artistic work. This artistic feeling must, however, be improved and restrained by education, and the best education is the careful study of nature and the works of the great masters of landscape art, such as Turner, Constable, Cox, and De Wint amongst our English painters, or Corot, Daubigny, Millet, and Rousseau amongst the French. By the careful study of the work of these men and comparing it with nature, much may be learnt in composition and light and shade, and must surely have a vast influence in the formation of sound taste and the improvement of photography.

This brings us to our third point, viz., the great advance that has taken place in artistic taste during the last thirty or forty years. In the matter of photography alone, for to this our remarks are confined, we see that vast strides are being made; many artists and people of educated taste are now included in the ranks of amateur photographers, and the works exhibited at the annual and other exhibitions show marked advance. In a review of the recent exhibition of the Photographic Society the *Times* says: "It illustrates very forcibly the distinct improvement which has recently been effected in printing methods, and it shows a marked advance—consequent to some extent on that improvement—if not in the artistic capacities of photographers, at all events in their powers of producing the most artistic results with the appliances at their command." This is very encouraging, certainly the greatest advances have been made in the printing and reproduction of photographs; numerous methods have been invented, and in many cases most beautiful results obtained.

The day of the old silver print is passing away, faster, if possible, than the prints themselves, and platinotype, sepiatype, autotype, and other processes are taking its place. The results are to be seen everywhere in the illustrated books and art magazines. In fact, it would be almost safe to predict that the days of wood and steel engraving for the purpose of book illustration are numbered. Certainly in future all scientific works will be exclusively illustrated by the aid of photography. The truth is that artistic photography is behind the times; the printer has gone ahead and is waiting for his artistic ally. That he is coming up rapidly is certain, and everything that can be done to assist his progress will be hailed with delight by all true artists, whether they call themselves painters or photographers.

John Andrews.

PHOTOGRAPHY FROM YACHTS AND BOATS.

THE general conditions under which photographs are taken from yachts and boats moving on the surface of water differ in a greater or less degree from those taken on shore, according to the size and character of the boat from which the photographs are taken, the size of the photographs, and the standard of excellence—technical or artistic—required in the results. In large yachts or vessels whose tonnages are individually measured by three figures, shore apparatus and methods can be used effectively, the camera being supported on its usual tripod, the lens diaphragms used if necessary for covering power, and even the time-honoured cap for exposing. In a small boat, on the other hand, the same arrangement even in smooth water would be quite unmanageable, special means being required to keep the apparatus steady, to focus and compose the image, and to expose the plate. The chief cause of the success in one case and failure in the other, is that the movements of the large boat are slow and easy, whilst those of the small one are quick and lively,—the movements referred to being the oscillations of the boats. The same cause illustrates why, with two boats of the same size, but of different construction, one will require totally different appliances to the other, the deep draught and heavily ballasted boat with almost vertical sides being both slower in its motions, and these motions being generally less in extent than in the case of a shallow, lightly ballasted boat with rounded bilge. The size of the photographs taken, affect the mode of working, inasmuch as a small instrument is generally best supported by the photographer himself, while the large instrument requires some special appliance to support it. The standard of excellence required, obviously affects the conditions of working, inasmuch as these conditions must be more perfect in proportion to the desired excellence.

Although the modes of working differ under varying circumstances, the qualities required in the appliances are, with the exception of work from large vessels, the same, and may be stated as follows :—

(*a*) A means of placing the camera in the best position—first, as regards its view of the subject; and, second, as regards its distance from the same.

(*b*) A means of focussing with the plate or film in position for exposing.

(*c*) A means of adjusting the position of the subject on the plate at the moment of exposure.

(*d*) A means of preventing the motions of the boat injuriously affecting the sharpness of the image.

To these special qualities must be added those usual for instantaneous work on shore.

(*a*) Is usually accomplished by the boat which carries the instrument; and in photographing from small boats and yachts a great deal depends upon the skill of the person in charge in getting the boat into position ; for while it may appear a very simple matter to sail or steam into any desired place, it in many cases requires the greatest nicety in sailing and judgment to do so ; the effect of tides, direction of wind, speed, and direction of sailing of the object, and direction from the boat from which the photograph must be taken to avoid getting spars or rigging in the way, etc., all have to be allowed for and considered. When photographing yachts racing, their direction of sailing being known with approximate accuracy, the photographer can place himself and boat well in advance in the right position, and simply wait for his subject, care being taken not to get in the way or injure the wind. Similarly where fishing-boats or other vessels sail along certain tracks, such as the Plymouth fishing fleet between Rame's Head and the Catwater, it is an easy matter getting the desired distance from, and view of the subject.

There is another method of getting the best view, etc., of the subject when the latter is a boat, which, although little used, is preferable where it can be adopted. It consists in the vessel from which the photograph is to be taken being moored or stationary, and the vessel to be photographed placing itself in position. Under such circumstances not only can any particular view readily be taken, but, to a great extent, the best direction of sky or sunlight obtained—*an advantage of the first importance.* If the photographer wishes to photograph his own vessel, he cannot do better than sail out to the nearest lightship in his vicinity when the weather suits, and, obtaining the permission of the officer in charge, use the lightship as the platform from which to take the photograph. It is necessary to give the sailing master careful instructions as to the position and direction in which he is to place the vessel, and arrange a simple signal so that he may port or starboard his helm a little at any desired moment.

(*b*) There are two methods of focussing with the plate in position. One, by means of a second lens having the same, or approximately the same, focal length as the first, and which moves with the same rack, and is therefore in focus at the same time: the plate being ready for exposing with one lens, the focussing is adjusted with the other immediately before the exposure.

A better method consists in graduating the base of the camera into distances which by actual trial have been found to give a sharp image when an object is placed at these distances from the instrument, similar, in fact, to many forms of hand camera. It is better not to measure the distances for ascertaining the focus, but to guess them, taking with a fair sized instrument such distances as ten, twenty, forty, and eighty yards, and the principal focus (focus for distant objects), the reason being that the quick guess of a distance is more constantly accurate than the mental problem of how many yards away a certain object is situated. The distances should be taken on the water, remembering that large objects appear nearer than small ones, also with the rising front at its full height, and the vertical swing tilted backwards sufficiently to render a vertical object sharp from top to bottom, such being the normal condition for work on the water.

(*c*) Is accomplished by the view-meter, of which there are many forms, but only one well adapted for the present purpose. It consists of a frame of wood or wire mounted on the rising front of the camera, and of such a size that, looking through it from a few inches behind a sight fixed in the back of the camera, one eye being closed, exactly the area of subject is seen through the opening in the frame as is included by the lens on the plate. In order to centre the subject, and to make the margins of the view correspond with those on the plate, thin wires are stretched crosswise from the corners of the frame, and when looking through the instrument the sight is kept in line with the intersection of the wires; further, to ensure the water-line being horizontal, a wire is stretched horizontally across the frame. Not the least of the advantages of this form of view-meter are that it is equally accurate for any position of the rising front and swing-backs; for any lens; and the photographer is looking straight at his subject and can carefully adjust his lens and camera while giving orders for steering or sailing, up to the moment of exposing.

(*d*) The chief cause of blurring, in addition to those occurring on shore, is the rocking of the boat, and, as may be inferred from what has been stated previously, the boat is the chief factor which determines the means employed for obviating it. In all boats whose oscillations are slow, whether due to their size or mode of ballasting, or shape, the camera can be fixed—and is better so—rigidly to them at the moment of exposure, without fear of blurring; all that is required is to choose the most convenient position for manipulating the camera, without the view being interfered with by spars or rigging, and to fix in this position a support for the instrument, which can be adjusted to suit the heel of the boat, the longitudinal movement being generally neglected. In a large vessel with high bulwarks a board is hinged, having a metal rod moving in a socket fixed at the after-end, and clamping at the desired angle with a screw. In smaller yachts a similar contrivance is fitted to the sides of the cockpit, or other convenient position, or the camera may be

Before the Wind.

swung, in which case the joint is made sufficiently stiff to prevent the camera swinging by itself. Whatever form of support be used, it must be rigid, that it may not spring or vibrate by the motions of the vessel. A vibratory motion imparted to the camera from want of rigidity in its connections with the boat is more fatal to sharpness than all the movements of the boat. A similar vibratory movement frequently occurs with small steam vessels and launches, due to their engines ; and this effect, as well as their liveliness in disturbed water, renders them far inferior to sailing boats of the same size.

In a small boat it is a more difficult matter to get steadiness. If the boat is strong enough, and the consequent loss of speed is not objected to, two large bilge keels can be fitted to it, and the camera supported on a short tripod whose legs are screwed down to the bottom of the boat, and which has a large triangle at the apex. The camera faces the stern, and the photographer works from the middle of the boat. It is understood that no one would attempt to photograph from a small boat in a rough sea, which is probably impracticable with a camera of any size. A small boat's proper work is the river or shallow shore in fine weather. Bilge keels, although fairly effective, are usually considered objectionable if permanent in a boat, and are a good deal of trouble to put on and off if made removable, the boat having to be put ashore each time. A more practical plan is the following :—The boat, if it has not already a mast for sailing, at from one-third to two-fifths its length from the stem, is fitted with a short one, and on the mast are clamped the ends of two long and strong sculls, the blades of which spread well below the surface of the water, and with their flat sides opposing the rolling motions of the boat. If the boat is partially decked and strongly built, the sculls can be clamped to the sides where they touch ; but in most boats it is necessary (and always advisable) to strengthen these joints with iron rods fixed to the heel of the mast and reaching out to the sides. Almost the whole strain is taken by these joints ; and if the boat is any size, these strains are very considerable, and might tear the planks apart. A small boat, fitted in this manner, and which without the outriggers would in a rough sea be difficult to stand in, becomes, with the outriggers in position, almost immovable as regards rolling.

A somewhat more elaborate apparatus for steadying the camera, usable in any boat, was exhibited by the author at the Crystal Palace Exhibition, and called forth many amusing remarks from visitors; it consists of a pair of strong gimbals with screw bearings, supporting a table for the camera and a heavy lead weight, the whole arrangement being further supported from the sides of a copper trough filled with treacle; a cover encloses all but the central rod and table. The viscosity of the treacle being adjusted to accommodate the movements of the boat, a support is obtained which is always level, and sensibly free from quick motions.

In choosing a method and position for supporting the camera, an important point is the height of the camera above the water. For nearly all sea work and much river work the best height is, in the writer's opinion, not less than ten or twelve feet, and if less than this, every foot gained in height is a distinct advantage. For this reason, if it could be rendered practicable, a support fixed to the mast would be the best for small yachts.

The qualities required in camera, lens, and shutter, are very much the same as for work on shore. Rigidity in the back frame and front of camera are very important; the extremely light instruments which with care are adapted for use on shore will cause much trouble on the water. However rigidly the camera be clamped to its support, the impact of the water against the boat will keep the instrument vibrating; and when focussing with the plate in position, unless on setting up the camera all parts assume exactly their normal position, or are "in register," there will be failures in focussing. The best plan, perhaps, with a light instrument, is to focus each time for the distance it is intended to expose at, and put up with the view which presents itself at that particular distance. The side-swing, unless already provided with a pivot on its centre, should have one fitted. The focal length of the lens can hardly be too great, as there is no class of subject more liable to exaggerated perspective—it is time some more satisfactory explanation of the apparently unreal perspective in photographs were elucidated than that at present given—the usual type of lens employed is the rapid symmetrical, focal length not less than twice longest side of the plate. Opinions differ as to the best form of shutter, most likely because good work can be done with almost any form. When working under difficult conditions as regards light and exposure, the blind shutter close to the plate will probably be conceded the best by those who have used it. Plates require attention to keep in good condition at sea. In quantity they are preserved in soldered metal cases. Opened cases, the camera, and slides are kept in an air-tight metal box, which is opened during the day in fine dry weather. Plates should not be kept in the slides longer than can be avoided. In fairly strong sunlight, with *f*/8 aperture, and the quickest commercial plates, sea subjects require about $\frac{1}{60}$th second; without sunlight, $\frac{1}{20}$th second. For cloud effects near or including sun, $\frac{1}{250}$th second; and the same for night effects, with sea, etc. included, and plate more developed. These are the minimum exposures. For developing the writer prefers ammoniacal pyro., using the strongest developer the plate will stand without fogging, and in a *safe light.* Such a developer is not weak but strong in bromide. If density be deficient, treat with fresh doses of developer, and give plenty of time. After fixing, the main washing may be performed in sea water, finishing with a rinse in fresh water, and wiping the film with a soft sponge.

It may appear that in the foregoing notes an unnecessary amount of trouble is advocated, when a simple hand camera will probably work as well; it is therefore necessary to state that good effects afloat require much labour and time to get, and are not worth the trouble if small. When it is desired simply to secure passing effects, the most important qualification is readiness for instant use; and probably the most useful instrument for the purpose, is a $7\frac{1}{2}$ by 5 conical box camera, reversible, having a 20-in. focal length rapid symmetrical lens, provided with a rack; a wire view-meter as previously described; and the whole fitting a skeleton wood gunstock for exposing from the shoulder.

The photographer afloat has many advantages and pleasures over his brother ashore. For infusing life into his work, he has the sparkle and motion of the water, the tension of the sails, and the ripple of the burgee; probably his dark-room and printing establishment are within reach; he can use big instruments without porterage, and that combined with a sense of sport which is absent ashore; he has the freshness and freedom of life only found afloat; and if a sailor, the world for his playground.

HOWARD FARMER.

THE AIMS OF ARTISTIC PHOTOGRAPHY.

A FEW short years ago any one who spoke of the possibility of photography taking its place among the pictorial arts would have been looked upon as a visionary and a dreamer of idle dreams; but so great are the strides which have been made in the advance of the pictorial side of photography that the dream seems now on a fair way to become a reality.

The known processes of photographic reproduction of those days had more to do with the small estimation in which photography was held by all men of artistic feeling than any want of technical skill on the part of those who practised the art, if art it could be called.

But now, thanks to more perfect methods of reproduction, we are enabled to obtain pictures which give relatively true values, and in which the effects of light and shade can be reproduced with very great exactitude. The greatest danger against which we have to guard is that, having progressed so far, we may imagine that we have attained the goal of our ambition. Let us never be satisfied with that which has been accomplished, but ever struggle onwards to what may appear to be the unattainable; and as we progress so will new possibilities open out to our view, new vistas of the infinite beauties of art.

Another great hindrance to the advance of our art is the ease with which a certain excellence of manipulation may be attained, which induces many to think that they can master the art in a few months, merely because they are able to produce work which flatters their own vanity and gives a certain amount of pleasure to their friends. Nothing that is worthy of the name of Art can be attained save by careful study, hard work, and proper guidance, combined with a liberal education and an absolute determination to overcome every difficulty. Though it may be true that "*Poeta nascitur non fit*," this is by no means true of the artist; the poetry of his art may be born in him, but nothing but the most careful training can direct this poetic conception in the right path. He must spend years of his life in the Art Schools of London, Paris, or Rome, and live amongst the works of the old masters, the giants of art, before he can hope to gain even the first step on the ladder which is to lead him ever onward and upward.

It may be that few of us can devote the years of patient study and untiring work which are necessary to those who would attain real excellence; but much may be done by a careful and earnest study of the works of the old masters, which are open to all who care to devote a few hours a week to real and diligent study under proper guidance of the masterpieces which adorn the walls of our own National Gallery.

There are surely few of us who cannot number an artist amongst our friends; and any artist who sees that we are truly and really anxious to attain a knowledge of art will spare some little time to point out to us what to study and what to avoid, for we learn as much from that which is to be avoided as from that which most nearly approaches perfection. Perfection in art is, of course, impossible to man; but we must strive to approach as nearly as is possible to the unattainable.

We shall find that excellence is neither the prerogative of one master nor of one school; but that each has its own beauties, each its own lesson, for those who care to learn.

This is a lesson which must be brought home most strongly at the present moment to those who are aiming at the artistic in photography. There are at present practically two schools– the old-fashioned photographer who makes everything as sharp and microscopically full of detail as the lens will render it; the other which rushes to the opposite extreme, and to whom detail is "αναθεμα μαραναθα," and who seek to attain their object by throwing the lens out of focus, or in some cases doing away with the lens, and using a pinhole in its place.

Let us deal with the sharp-focus school—the school to whom detail is as the breath of life. Can they be said to depict Nature? or do they not rather, by their exaggerated straining after truth, simply distort Nature, and depict her as no eye can see her? We do not wish to study the beauties of Nature with an opera-glass, or even with a microscope. This may suit the *savant* and the man of science; but it is not art, nor any approach to art. Nature is never seen thus by the eye, and in art we must render Nature as the eye sees, as faithfully and as truly as we can; but not more truly than the unaided eye of man can see.

Remembering that our art is for the eyes of men, not flies, Nature has given us powers of vision suited to our state; and we wish to see no more than Nature enables us to see. The words of Pope, in his "Essay on Man," say so much in a few lines on this subject that I cannot do better than quote them:—

> "Why has not Man a microscopic eye?
> For this plain reason—Man is not a Fly.
> Say what the use, were finer optics given,
> T' inspect a mite, not comprehend the heaven."

And bearing this in mind, let us try to reproduce Nature as we see her, not as she may appear to the fly; and remember that the broad truths which are revealed to our eyes are those which alone concern our art.

> "First follow Nature, and your judgment frame
> By her just standard, which is still the same;
> Unerring Nature, still Divinely bright,
> One clear, unchanged, and universal light;
> Life, force, and beauty, must to all impart
> At once the source, and end, and aim of Art."

And now to consider what it is that we do see in Nature, for that is the main point. Take, for instance, the most beautiful thing in Nature—a beautiful woman. What do we see when we gaze upon her? A face divinely fair. Our eyes rest in perfect peace and contentment on the face; and though they may wander in admiration over the perfect form and figure, they always return to that which is the true attraction—the face. This it is which lingers in our memory; this we never forget, even when our eyes wander away from it for a moment. This is the picture; the rest is but accessory. What care we whether the background be well or ill defined? We only see this as a framework to the picture. It is *of* the picture, but it is not *the picture*. Does it not follow, then, that this is what we have to consider when we try and picture her. The face must be all in all. The rest, being but accessory, must be kept down; so that in the picture, as in life, our attention is riveted on the face, and nothing must detract from this—nothing must withdraw our gaze to that which is of subsidiary importance. The rest is there—the figure, the background—nothing is omitted; but it is judiciously kept down, and all our art is lavished on the face to make it as perfect and true to life as art can make it. This is the truest aim of art, and the only one that can give us a truthful rendering of Nature as she is revealed to us.

Those who wish to learn what can be done in the matter of true centre of focus can do no better than study carefully the works of the great Dutch masters, such as Maas, Wouvermans, Paul Potter, Teniers, and others of this school; and in landscape Ruysdael. But landscape is better, perhaps, studied in the Norwich (English) school, which is really the great system of all true English landscape painters; such as Gainsborough, who was as great in landscape as in portrait painting, and Turner, who without the labour of this school could never have been able to paint those masterpieces of artistic conception.

Examples of all these masters can be seen at the National Gallery, and will well repay the most careful study. Though in some senses photography is far easier than painting, yet in other respects it is infinitely more difficult; for a skilful painter can, by the perfection of his colouring, often blind us to defects in drawing. Photography has no such power, and is dependent on perfect drawing of line and form, light and shade, and can gain no help from gorgeous effects and the subtle harmonies of colour.

The painter, therefore, having a power which is forbidden to the photographer, it follows that the difficulty of our art is immensely increased; but do not let that discourage us—the greater the difficulty the greater the glory, if we are able to surmount it.

We must always bear in mind this distinction between the painter's and the photographer's art, and by studying his methods learn how we can best attain the object for which both are striving. What is the first lesson that we learn? Is it not that the painter first puts down what is the *raison d'être* of his picture, and then carefully works out all the accessories, so that they may be in harmony with the central idea, but never detract from it by being thrust into undue prominence? He will lavish all his skill on that which is the true object of interest, and carefully work in the rest, judiciously keeping down all that is not of main importance, blending the whole into one harmonious picture.

This, then, must be the aim also of the photographer. He must compel his lens to see what he sees, in the spirit of the effect. The principal object must thrust itself on our notice; the rest must be kept down, and yet be in harmony with that which is really the picture. I do not propose in this paper to consider the technical methods best suited to attain this object; each will work in his own way to obtain the desired result; and if only they will bear this first principle always in view, there should be no doubt of their ultimate success in reaching a very high standard of artistic excellence.

The same lessons which a careful study of the works of the old masters teach us, as to the faulty work of the microscopically sharp school, apply with equal force to the fuzzy school. This latter school is of comparatively new growth, and is probably founded on a misconception of the teaching of Dr. Emerson as set forth in "Naturalistic Photography," and his other works on photographic art. The tendency of this school seems to be in avoiding what appears to them offensively sharp, to rush into the opposite extreme, and to render everything so blurred and fuzzy that it is often difficult to discover what their pictures are supposed to represent. Apart from this general indistinctness and fuzziness, they appear to lose sight altogether of the fact that there must be some point of interest in the picture which should hold our attention, and which must be sufficiently distinct to tell its own story. Instead of this the whole picture is degraded to one dead level of monotonous dulness. As it is true that a picture should not be more sharp than the unaided eye of man can see, so it is also certain that it should not represent Nature as she appears only to the man who is losing his powers of vision from old age or disease. Another important point which has escaped the notice of the pinhole photographers is, that by the use of the pinhole they are throwing away one of the greatest advantages which photography possesses over all other methods of pictorial art—viz., the power of instantly seizing and picturing a momentary phase of Nature, whether of light and shade or motion, or any of those fleeting and momentary changes with which she is continually delighting those who study her wayward moods. Take, for instance, a landscape pure and simple, without any living objects. How is it possible to get a true representation of this in the long exposure necessary with a pinhole? The beauty of the picture is dependent on a truthful rendering of the gradations of light and shade; but as these are ever varying, how is it possible to give a true representation of an ever-changing scene except by the most rapid exposure which the lens will allow? Again, what is a landscape without the sky? and how can this be rendered truthfully save by a most rapid exposure?

I think it is Ruskin who says that rocks, trees, mountains, are the features of landscape; but its expression is from above, and Nature smiles or weeps as the atmosphere affects her. Hence the importance of the sky in landscape is paramount—an importance not diminished even when it forms but a small portion of the composition.

Study the works of Constable, and see what careful study he gave to a truthful rendering of the skies in his landscapes; he did not think it waste time to spend entire summers in painting skies from Nature. As he himself says: "It will be difficult to name a class of landscape in which the sky is not the keynote, the standard of scale, and the chief organ of sentiment,—the sky is the source of light in Nature, and governs everything."

In pointing out what appear to me to be amongst the chief objections to the microscopically sharp and the pinhole school, I trust that I have said nothing which may give offence to the followers of either; my endeavour has simply been to try by inducing both to study carefully the works of the great masters to enable them to suit their methods of work to those great lessons which such a study cannot fail to give.

The pinhole school seem to imagine that if they are able to produce a photograph which bears some resemblance to an etching, that they have done great things, and that nothing further need be attempted; but this is taking a very low standard; and if this were all that could be aimed at, it would be hardly worth while pursuing the artistic side of photography. A photographic picture should be a thing distinct, and make no pretensions to be what it is not; it may supplant engraving, but should never aim at being mistaken for an engraving. Each method of pictorial production must stand by itself; the painter, the engraver, the etcher, and the photographer must each be judged by the highest standard of excellence attainable in their own particular branch; and though each has much to learn from the other, they are and must always remain separate branches. The photographer may be of immense service to the artist, by enabling him to obtain studies for a picture—studies which require often to be grasped in a moment, to be subsequently transferred to the canvas, and which often are of such a fleeting nature that without the aid of photography it would be impossible to give a sufficiently accurate representation. That the photographer has much to learn from the artist is so self-evident that it requires no argument.

Again, for the reproduction of pictures photography is invaluable; it is the only method which can truly reproduce the individuality of the picture, and in which the artist can see his own handiwork unmarred by a would-be improver; but though this work can be brought to a very high standard of excellence, it must by no means be looked upon as the final aim of photography, though as a means of study it will be found invaluable; for by it we are enabled to reproduce the works of the great masters in black and white, and can study them without being confused by effects which are solely due to colour. The great aim must, of course, be to produce original work worthy to be called a picture; and if only the right methods be followed, this should not be a dream of the distant future; but remember that before we attempt to produce works of art, we must first learn the rudiments of art, and understand what is worth producing, and what is unworthy. To few only is it given to be endowed with the genius of artistic perception; to fewer still with that of artistic conception. There are many who look upon a picture and fail to see Nature; there are many more who gaze upon Nature and fail to see the picture; gems of infinite beauty surround them on every side, but their eyes are not opened, and they see not.

How then can we learn to see these things? Must we not seek light from those who can see already? If only the Camera Club can be induced to take the matter up, and institute evening lectures on the principles of art, they may raise the standard of artistic excellence in photography to a level hitherto undreamt of, and at the same time take their proper place in the van of photographic advance.

Finally, I would say to all, take a proper pride in your work, but temper your pride with a sufficient modesty in estimating your own attainments.

"Trust not yourself, but your defects to know,
Make use of ev'ry friend, and ev'ry foe."

ERNEST J. HUMPHERY.

PHOTOGRAPHIC PORTRAITURE.

THERE can be no doubt that among the many advantages we have at the present time over those enjoyed by our ancestors, may be reckoned the spread of, and great and rapid improvement in, the art of photography. That this is largely due to the efforts of amateurs, among whom in some branches of the art are to be found the leaders, far be it from me to deny; but the particular branch with which I am now concerned, namely, portraiture, owes but little of its wonderful development to them. There are many good reasons why this is so; and it is not for the professional photographer to complain, for were amateurs to practise portrait photography with an equal assiduity and success as they do landscape photography, they would seriously, very seriously, compete with those who endeavour to make a living out of the practice of this branch of the photographic art.

Whether photographs of land- and seascapes are a help or a hindrance to art, is a question that I need not enter into here, although I have not the smallest doubt that it owes much to them. However, be this as it may, the *raison d'être* of photographic likenesses is fully established on quite different grounds. Beside the historical value of likenesses of public persons, it is natural to wish to possess those of our friends. Likenesses are also useful to persons in certain professions when seeking situations, and for many other purposes. These reasons are in themselves quite sufficient to justify photographic portraits, independently of any artistic merit they may, or may not, possess. Granting this much, it follows as a matter of course, that the better these portraits are as likenesses and as photographs, the better they will fulfil the objects for which they are produced; and if, without damage to the truthfulness of the likenesses, they can be made artistic, so much the better still. It is because, great as has been the improvement in them of late years, I feel that they are capable of still greater improvement, that I venture to write this short article upon the subject.

The most essential quality of a portrait, whether it is a painting, drawing, or photograph, I take to be that it is a good likeness, and next that it is artistic. Some people—not readers, I expect, of the PHOTOGRAPHIC QUARTERLY—suppose that an untouched photographic portrait must be a good likeness, however bad a "picture" it may be. Now this is quite a mistake. A good likeness not only reproduces the features correctly, but also a characteristic expression of the sitter. As a general rule the ordinary private person who goes to a photographer's for the purpose of having his portrait taken, no sooner arrives at the studio than he becomes nervous and self-conscious, and therefore assumes an expression totally unlike any usual to him. And it must be remembered that most persons recognise those they frequently see rather by expression than feature. This nervous self-consciousness and a tendency that many people, particularly ladies, have to dress in their least suitable clothes, are perhaps the two most trying things in a sitter with which the photographer has to contend. On the whole, however, it is usually the operator, and not the sitter, who is to blame if the ultimate result is unsatisfactory.

I will now consider what it is that one must guard against if one wishes to produce a photographic portrait correct as a likeness and artistic as a picture—at once pleasing to the sitter and satisfactory to the photographer. In the first place the photographer is undoubtedly much worse off than the painter is, in the question of dress. It is very seldom that a photographer can have a word in the choice of the dress of his sitter. There may be some rare exceptions in the case of a few photographers of high standing when taking ladies and gentlemen of the theatrical profession on special terms; but such exceptions only occur very seldom, where in the case of painters it is the rule to consult them in the matter. Ladies about to be photographed should remember that in a portrait it is the features, not the frock, frills, and furbelows, that are most important. Do not let it for one moment be supposed by this statement, that I do not think dress a very important consideration in a portrait, for I do; but it should be considered rather from the standpoint of the artist than the dressmaker. Again, there is a fear of my being misunderstood, and the reader thinking that I advocate some special so-called artist style of costume unlike anything one would usually wear. Nothing of the kind is my intention. What I do strongly object to is some special *in*artistic style of dress which no one would think of wearing except to be photographed in. As a general rule it is best, when going to have one's likeness taken, to go in one's most comfortable clothes, which will probably not be one's newest or most trimmed, but the least stiff and best made. Although the last few sentences refer specially to ladies, much the same may be said to gentlemen. To them I say emphatically, do not come in a new coat if you possess an equally well-fitting one that has been worn some time. It is, of course, impossible to lay down hard and fast rules applicable to all alike. The great thing is to dress so as to feel comfortable and be natural. I have said nothing on the question of colour, and I think it hardly necessary to do so, for at the present time almost everyone knows which colours photograph well, or at any rate which do not.

Expression is, of course, of even greater consequence than dress. Here again the photographer is at a disadvantage; for frequently, aye generally, the pleasantest and most natural expression of a person is an animated one, which the restraint of having to sit quite still—even for a few seconds—and the consciousness of being photographed, render it impossible to have at the moment of the exposure. The facial expression is sure to be stiff and strained when the sitter is posed in a stiff unnatural position. The question of posing is one of the most, if not the most, important with which the portrait photographer is concerned, and I venture to think that it is one of the least generally understood. To pose a person, or a group, well one must be sufficiently an artist to know at once what will make a good picture. Many operators try ever so many positions before they decide in which to take the portrait. This, I maintain, is wrong. By so doing one tires and fidgets the sitter, and if he has the smallest inclination to nervousness it is thus greatly increased. Speaking from experience I have found that, as a general rule, the best portraits are those taken with the least posing. This is certainly the case when the sitters are private people. Ask your sitter to take a seat, and talk to him naturally on general subjects, and being thus put at his ease he will in all probability take a good and natural position, with perhaps—for "perhaps" I fear one may read "generally"—the head a little on one side, which, without any tiring trying of different attitudes you can easily get him to rectify. The great thing is—and it cannot be too strongly insisted upon—to have the sitter at his ease. Of course I do not mean that he should be taken lolling about anyhow ; but what I do mean is that it is quite possible and easy to get almost any one to take the good position you require without making him uncomfortable or worrying him. I have myself often found it advisable to take a person first in a relatively bad position, and having made the first exposure I found it easy to get my sitter to take a fresh position for the second one, without his feeling bothered and worried at having to do so. What the professional photographer should remember is that too much posing is a common and most inartistic fault.

In a short article I cannot deal with all the questions affecting portraiture. As to the relative merits of silver-prints, platinotypes, etc., and the best sizes and shapes of portrait prints, I shall leave them for the present.

In no form of photography is lighting of greater consequence than in portraiture. For my own part I do not usually approve of startling effects of light and shade in a portrait, for, however much it may add to the charm of the picture, it most certainly detracts from the truthfulness of the likeness. No invariable rules can be laid down for lighting and posing. In each photograph taken the operator should be influenced by the subject to be photographed. Some people are best taken full-face, some three-quarters, and a very few in profile. Some look best lighted from the left-hand side, others from the right-hand side; some by a strong light, others by a more subdued one. A photographer, who is sufficiently an artist to take a good portrait, will know at once how to place and light his sitter so as to obtain the most satisfactory results. Of course experience is required to learn this art; but that experience should not be got at the expense of customers. It is much too common an idea that any one can be a photographer, without taking the trouble to learn the craft, and this is the reason why we have so many ghastly failures called photographic portraits.

ALFRED PATERSON.

AIR AND VENTILATION.

FEW things are of greater importance than pure air and the means of obtaining it; few things of equal importance receive so little attention. To no one is the subject of more vital interest than to photographers, working as we do, for many hours at a time, in rooms which are often of very small dimensions—often, in fact, little better than cupboards. Of late years, moreover, the ranks of amateur photographers have been joined by many who do not enjoy good health—some, indeed, being already afflicted with lung disease—and it is absolutely essential that the conditions under which they pursue their hobby should not in any way aggravate their malady. Many ladies, too, are enthusiastic photographers, and they, with their less robust organisation, are more liable than men to suffer from working under unsuitable conditions. A statement of the evils resulting from impure air, with hints as to practicable methods of securing fresh air, in language as little technical as possible, may therefore be of some practical value. The subject divides itself broadly into four questions : The influence of air on people engaged in photography ; its effect on photographic preparations during the process of manufacture; its action on materials in store; and the part which it plays in photographic processes themselves. In this article attention will be confined chiefly to the first question.

The air is a mixture of several gases, some of which are always present and may be regarded as essential constituents, whilst others are only found in certain districts, or under certain conditions, and may be regarded as impurities. Pure air, in the country, will contain on an average, in every 10,000 volumes—

Oxygen	2,095
Nitrogen	7,902
Carbon dioxide	3
Water vapour	Very variable.
Ammonia, nitrogen oxides	Minute quantities.
Organic matter	Minute quantities.

Nitrogen, oxygen, and carbon dioxide, are always present, and water vapour is very rarely absent. In towns, the proportion of oxygen is very slightly lower, whilst the proportion of carbon dioxide rises to 4 in 10,000. Town air also contains a much higher proportion of volatile organic matter, and certain gases and vapours resulting from various processes which are carried on to a much greater extent than in the country. Perhaps the most important town impurity is sulphuric acid (oil of vitriol), which results from the combustion of coal and coal-gas containing sulphur, and which remains in the air in the form of vapour until it is washed down by the rain.

In addition to the gases and vapours, we have to take into account the suspended matter, or, as we commonly call it, the dust. Very wonderful stuff it is. Organic and inorganic, vegetable and animal, living and dead particles, are constantly floating about, and become visible to us in the form of "the gay motes that people the sunbeam." Dust from various sources has often been examined. It contains minute grains of sand and other rock substances, particles of metallic iron, epithelial scales, hair, animal and vegetable *débris* of all kinds, minute organisms (both living and dead), pollen, spores of fungi and minute fungi themselves, and the microbes and germs of not a few dangerous diseases.

Air is essential to the respiration of animals, and the changes which take place when we breathe may be briefly described in the following way :—The air that we take into our lungs there comes in contact with the blood, which comes into the lungs from the veins, and the oxygen of the air combines with a purple compound (hæmoglobin) which is contained in the blood, and forms a new substance (oxy-hæmoglobin) of a bright scarlet colour. The oxygenated blood then goes through the arteries to every part of the body, and the oxygen of the oxy-hæmoglobin, which is only held in very loose combination, interacts with the juices, tissues, etc., of the body, and converts the carbon into carbon dioxide. The oxy-hæmoglobin is thus reconverted into hæmoglobin, and the carbon dioxide which is formed remains dissolved in the blood until it travels back through the veins into the lungs again. There the greater part of the carbon dioxide (carbonic acid gas) is given off into the air, and the hæmoglobin takes up a further quantity of oxygen and again forms oxy-hæmoglobin, which circulates through the body as before. Constant re-oxygenation is essential to the proper performance of the functions of the blood, and it is clear that this necessitates a constant supply of fresh air.

Combustion, such as goes on in fire-grates and furnaces, in gas-flames and candle-flames, is, in many respects, analogous to respiration. The combustible substances that are most commonly used consist chiefly of the two elements, carbon and hydrogen, and when the substances burn the carbon unites with the oxygen of the air to form carbon dioxide, whilst the hydrogen also combines with oxygen and produces water. These combinations are accompanied by a development of heat, and the combination of oxygen with the carbon of the body in like manner keeps up what we call animal heat. A supply of fresh air is as necessary for combustion as it is for respiration.

The effect of respiration on the composition of the air that enters the lungs is very great. The following table shows the average volumetric composition of inspired and expired air in 10,000 parts—

	Oxygen.	Nitrogen.	Carbon Dioxide.
Inspired air . . .	2,095	7,901	4
Expired air . . .	1,653	7,903	444

The expired air contains so much carbon dioxide, and so little oxygen, that if it is collected in any suitable manner it is found to extinguish a lighted taper and to be almost irrespirable by animals. Not only is a large proportion of oxygen converted into carbon dioxide in the process of respiration, but a considerable quantity of water is sent into the air in the form of vapour from the lungs and from the skin. Far more important from a sanitary point of view than either the carbon dioxide or the water vapour, is the volatile organic matter that is given off from the lungs with the expired air, and also from the skin. It was shown long ago, that the evil effects of this organic matter are far greater than those arising from the carbon dioxide. The evidence was of this kind; it was found that animals could, without noteworthy inconvenience, breathe for a long time in a closed space, provided that the organic matter was constantly removed from the air, even though the carbon dioxide was left. On the other hand, if the carbon dioxide was removed, but the organic matter was left, the animals very soon died. Recently it has been shown, by direct experiment, that the breath from the lungs contains small quantities of a volatile organic substance very similar to the ptomaines or leucomaines which are formed by the putrefaction of animal matter, and which resemble in many ways the highly poisonous vegetable alkaloids. The ptomaine, or poisonous organic substance, in the air from the lungs, is capable of producing extremely injurious effects.

The effect of combustion is to use up the oxygen of the air and produce carbon dioxide; but, in addition to this principal result, there are other changes which, although smaller in quantity, are even more important in their effects. Coal and coal-gas always contain a small proportion of sulphur, and when the coal or gas is burnt this sulphur eventually becomes converted into sulphuric acid. If the products of combustion escape into the air, which is usually the case with coal, the sulphuric acid remains suspended in the air until it is washed down by the rain, and the acid rain-water acts injuriously on buildings and on vegetation. When the products of combustion escape into a room, which is usually the case with gas, the sulphuric acid corrodes metal fittings and the bindings of books, and acts injuriously on the wall coverings, upholstery, and decorations. These effects are most marked near the top of the room, where the heated products of combustion collect, and the corrosive action is aggravated when the products of combustion come in contact with any cold body, for some of the aqueous vapour at once condenses on the cold body in a liquid form, and carries with it some of the acid vapours, which are thus brought in the closest possible contact with the particular object. It is a very obvious practical conclusion that book-shelves should never reach nearly to the top of a room, as they so often do; and that dry plates and other photographic materials should never be kept on high shelves.

Paraffin and petroleum have the advantage over coal and coal-gas that they contain no sulphur, and hence do not vitiate the air with acid fumes; but, on the other hand, even when burnt in lamps of good construction, they materially increase the quantity of volatile organic matter in the air, whilst the combustion of coal-gas in good burners has no such effect.

The effects of constantly breathing impure air are extremely serious. Lung diseases are always very prevalent where air is breathed over and over again; and, amongst the many instances that are on record, it will suffice to quote the case of a printing-office in which the ventilation was bad, and the cubic space per workman was altogether inadequate; the workmen "died from consumption as if it were a contagious fever." One highly dangerous disease—typhus fever—it may be mentioned in passing, is characteristic of places where the air is constantly impure; it never spreads in places where there is a sufficient supply of fresh air.

Even when an individual is only exposed to an impure atmosphere (*e.g.*, shut up in a small and badly ventilated room, like many photographers' dark-rooms) for a few hours, the effect upon health is injurious; and even though not strongly marked or immediately perceptible, may be none the less serious. The activity of the heart and lungs is reduced, the activity of the various organs diminishes, and the system is brought into a low condition, in which it is liable to become a prey to various diseases, and is especially susceptible to infection. Headache, languor, and dyspepsia are the natural accompaniments to such a condition of body, and, if they are not disregarded, are very useful danger signals.

The injurious effects cannot well be ascribed to a reduction in the proportion of oxygen; for even in very badly ventilated rooms the proportion of the gas is scarcely ever lower than 2,070 in 10,000.

Neither are they due, to any great extent, to the increase in the proportion of carbon dioxide, for quantities of this gas greater than are ever found even in vitiated air, may be breathed without injury. The evil arises mainly, as already stated, from the volatile organic matter given off from the bodies of living beings. The organic matter evolved from the lungs is highly poisonous when it issues from them, and it is possible that it may become still more dangerous by alterations which it undergoes in contact with the air. The extremely unpleasant smell that we have all observed on entering a badly ventilated or crowded room is due to the volatile organic matter.

Now, leaving out of consideration the case of rooms where large quantities of gas are being burnt, the causes which are at work producing volatile organic matter are also the causes which are producing carbon dioxide; and, as a general rule, the proportions of the two impurities remain in a nearly constant ratio. It follows that estimations of the proportion of carbon dioxide afford a measure of the quantity of organic impurity present. The sense of smell can also be used for the detection of organic matter; and it is found that when the proportion of carbon dioxide is 2 vols. in 10,000 over and above that normally present, the organic matter becomes perceptible to the sense of smell when any one enters the room directly from the fresh air outside. It is clear that the air should be kept so fresh that it has no perceptible smell; and hence the limit just stated, 2 vols. of carbon dioxide (from respiration) over and above the quantity normally present, may be taken as a standard of good ventilation. The following table shows the time required for one man to raise the impurity above the allowable maximum in rooms of various sizes, the air in them not being changed :—

Capacity of room.	hrs.	min.
10,000 cubic feet	3	20
5,000 ,,	1	40
1,000 ,,	0	20
600 ,,	0	12
200 ,,	0	4

In a small room, 9 ft. high and 8 ft. square, one man by respiration alone raises the impurity to the allowable limit in twelve minutes. What shall we say of some of the much smaller cupboards in which photographers will remain for much longer periods?

In addition to the changes produced by respiration we have the effect of gas, candles, and oil, which use up the oxygen and send into the air carbon dioxide, water vapour, and, in the case of candles and oil, volatile organic matter, which however is by no means so harmful as the volatile organic matter derived from the human body. For a given quantity of light the general vitiation of the atmosphere is less with oil-lamps than with coal-gas. In developing rooms in which the ordinary method of alkaline development is used there will also be vapours of ammonia; and although the evidence as to the exact effect of small quantities of ammonia on the human system is conflicting, there is no doubt as to the desirability of removing it as fast as possible.

It is calculated from the results of experiments that an adult man requires 3,000 to 3,600 cubic feet of air per hour, or, what is practically the same thing, one cubic foot of air per second. An ordinary gas-flame requires about the same quantity. The frequency with which the air in a room should be changed so that it may remain fresh, depends on the size of the room and the number of persons living in it and of lights burning in it. In a room of 600 cubic feet capacity (*i.e.* 9 feet high by 8 feet square) the air should be completely changed six times in an hour if one man is living in it and no lights are burning.

Ventilation may be divided into two kinds: *Natural*, in which advantage is taken of the difference between the relative weights of pure air and air that has been vitiated; and *artificial*, in which a current is produced by mechanical means. In an ordinary room with open fire the ventilation is done by the chimney, up which a current of heated, and therefore lighter, air is constantly rushing, whilst air to fill its place comes in through the openings in the doors and windows and through the walls.

The quantity of air which passes up an ordinary chimney is from 20,000 to 30,000 cubic feet per hour.

The products of respiration diffuse equally throughout a room, but products of combustion, being in a highly heated and therefore expanded condition, are relatively lighter than the air, and collect at the top of the room. Stand on the table in an ordinary room after the gas has been lighted for a few hours, and compare the atmosphere with that at a distance of three feet from the floor. The following determinations of the proportion of carbon dioxide in the air of an ordinary sitting-room, containing four or five people, with a coal fire and a paraffin lamp, illustrate this point.

	Carbon dioxide in 10,000.
Near the floor	7·33
Half-way up	9·00
Near the ceiling	14·65

It is clear that any exits for the foul air should be made near the top of a room, by opening a window or by fixing into the walls exit tubes of suitable size or shape.

In artificial ventilation the current is created by means of a rotating fan or some similar apparatus, by means of a cowl, or by means of a fire which produces an up-current of hot air. On a small scale the last two methods are the only ones practicable; and attention will be confined chiefly to the use of such methods in the developing room, or at any rate in small rooms.

The simplest and most rapid method of completely renewing the air in a room is to open the door and the windows and allow the air to blow through. This treatment should be adopted as often as possible in the case of small rooms which are used for photographic purposes, if perfect ventilation cannot be secured in some other way. The efficiency of an open fire has already been mentioned, but fires are not admissible in rooms from which all active light must be rigorously excluded. The developing lamp can, however, be made a very useful aid to ventilation, especially when gas is used. A convenient arrangement is shown in section in Fig. 1. A metal tube AA, two inches in diameter, is fixed in the top of the lamp directly above the burner, and runs up to the top of the room. Outside this is fixed a wider tube BB, five to six inches in diameter, the lower end being about six inches above the top of the lamp, whilst the upper end passes through the roof and has a plain cowl to keep out rain and prevent the wind blowing down the tube. The inner tube carries away the products of combustion, and in so doing becomes hot. The air surrounding it becomes heated, expands, and rises, and there is a constant current of air up the space between the two tubes so long as the lamp is in use. A very considerable quantity of air can in this way be taken out of a room. Where gas cannot be used, a tube four to six inches in diameter, opening into the room just below the ceiling and passing through the roof to the outside, where it ends in a Stevens's Patent Exhaust Ventilator, will answer very well, except when the air outside is quite still The cost is but small, the price of a cone for a four-inch shaft being ten shillings, and for a six-inch shaft fifteen shillings.

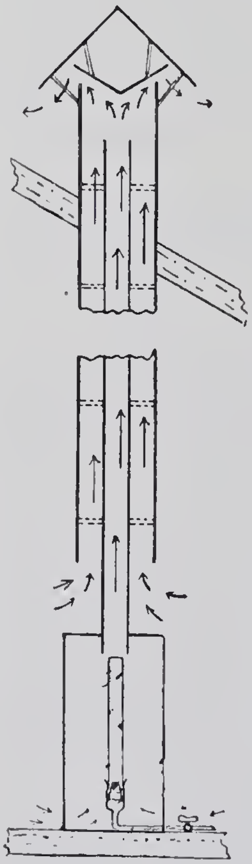
FIG. 1.

We have not only to secure the removal of foul air, but we must arrange for the entrance of fresh air, without at the same time producing a draught. In order to satisfy the last condition the incoming air must not have a velocity exceeding one foot, or at the most two feet, per second. It should not enter close to the floor, for then it is liable to bring with it a considerable quantity of dust, and the openings of the inlet get fouled with sweepings. It should come directly from the outside wherever possible, and not from another room or a passage, and the inlet must not be placed near a drain-grate or any other source of impurity.

One of the simplest and most efficient ways of securing a supply of fresh air (provided that the exit is working properly) is to build into the wall, if this is possible, bricks or gratings with conical perforations (Ellison's Patent Conical Ventilators, the wider end of the cones being on the inside (Fig. 2). Under these conditions the air is distributed uniformly; and even with a considerable outside velocity there is no perceptible draught. The Radiator Ventilator of the same inventor has also been found to work satisfactorily under difficult conditions. These can be fixed at low levels, and distribute the air equally in four directions without draught. Either of these would suit a small room, such as is very commonly used for developing purposes.

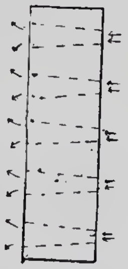
Fig. 2.

When a supply of fresh air from the outside cannot be obtained, but the air must be taken from a passage, it is often convenient to make the inlet in the door by cutting out a long wide strip of wood, and then fixing on the inside a kind of double box, shown in section in Fig. 3. This arrangement allows the air to enter, but excludes light. It may be made of wood, of metal, or even of stout strawboard or millboard.

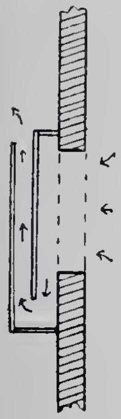
Fig. 3.

It is always desirable that the air should be filtered from the dust which it carries, and this is done by placing over the inlet wire gauze or coarse canvas, which is changed or cleaned from time to time. Dust is not only injurious to the lungs, but may also cause serious damage to plates, paper, etc.

Where unfortunate circumstances make it impossible to obtain efficient ventilation, every means should be taken to minimise the evil as far as possible. The developing lamp may with advantage be placed outside the room, the light being admitted through a pane of glass, but the gain is chiefly in the direction of a lower temperature, for the great evil is not the products of combustion, but the volatile organic matter from the lungs and body. If the room has a window, one of the upper panes of glass may be taken out and its place filled with a sheet of perforated zinc, or, better, by two sheets with a space between. Any draught arising from this may be prevented by putting round it a screen of thin wood or strawboard, open at the top. There is another simple and useful device, which is well known, but is not so often put into practice as it might be. A piece of wood (B) about an inch thick, four inches broad, and the exact length of the window-frame, is fixed at the bottom of the sash, so that the latter is always slightly raised; the air will then enter at the middle of the sash through the space between the wood and the glass (Fig. 4), and, being directed upwards, causes no perceptible draught. When the room has no window, or the window cannot be used for purposes of ventilation, an inlet should be made in the bottom of the door, and an outlet at the top, as indicated in Fig. 5. After the room has been in use the door should be left wide open for some time. If a rapid change of the air is required the door may be moved rapidly backward and forward several times; it will then act in the same manner as the punkahs which are used in tropical countries, and will displace large quantities of air.

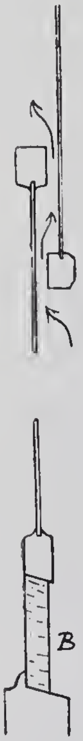

Fig. 4.

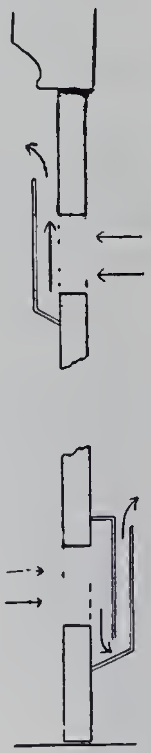

Fig. 5.

In conclusion, it is impossible to insist too strongly upon the absolute necessity of doing everything that is possible to secure proper ventilation. Few poisons are more stealthy in their action, or more certain in their evil results, than foul air constantly or frequently breathed. Few people are more careless—I will even venture to say, more foolhardy—in this respect than photographers, both professional and amateur.

C. H. Bothamley.

INSTANTANEOUS PHOTOGRAPHY THIRTY YEARS AGO.

AN occasional indulgence in retrospection is good for all, and is sometimes extremely profitable if only to show what to avoid in the future.

The photographic legion of to-day know so little of the photographic methods of thirty years ago that it cannot fail to be interesting to put back the clock—so to speak—for that period, and in imagination to throw ourselves into the midst of the labours of a past generation of photographers.

To begin, we cannot do better than examine the kind of work usually produced at the period immediately preceding the publication of Le Grey's instantaneous sea studies, the advent of which startled and astonished the photographic world.

Collodion, introduced nearly ten years before, had passed the probationary period, and now, improved by the various workers from time to time, had come into very general use. There were still a considerable number of calotype workers—that is to say those who practised the method of Fox Talbot and made paper—waxed or otherwise—the basis of the negative instead of glass, rendered necessary by the introduction of collodion.*

The single achromatic lens was solely used for outdoor work, and was almost invariably stopped down to extreme limits, for sharpness of the most pronounced kind was the fashion in those days, and anything approaching fuzziness or indistinctness, was condemned as bad photography. The most successful subjects of this period were architectural ones; and the French, and indeed the Continental workers generally, produced pictures of what might be called grand proportions when compared with the average productions of English photographers. Le Grey was distinguished for his architectural pictures; and I have before me at this moment of writing an example of his work which would hold its own, even against the work of to-day. It is true the subject is a striking one, viz.:—The tympanum of the west doorway of Notre Dame in Paris. I find on measurement that it is 20 × 16. It is probably from a waxed paper negative, for there is a mellowness in the details of the sculpture that strongly suggests that medium. The print, though slightly yellow, has lost nothing, and this yellowness really aids in giving effect to the architectural subject. Macpherson of Rome produced very large photographic examples of the architecture of the ancient city, and one of them, a picture of the Coliseum, was made up of three separate prints joined together, and measured not less than 48 × 24. In England Mr. Earl, of Worcester, produced some striking pictures of Raglan Castle, of large proportions, but the average large work did not exceed 12 × 10. Bedford'sa rchitectural pictures were generally of this size, and were well known for their artistic quality.

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* It may be interesting here to note that Le Grey and others hoped to use collodion as a substitute for paper, and therefore they anticipated the present celluloid film, which is, after all, a modification of collodion.

But whilst architecture offered few difficulties to the photographer the same cannot be said of landscape. Strikingly picturesque subjects—such as the weird, gnarled trunks of ancient giants of the forests—were probably as successfully rendered then as now; but when the subject depicted happened to be an open glade exposed to every wind that blew, the difficulties incident to long exposure were considerable; and the wary photographer knew that the exercise of patience and the power to wait were the only means at his command to help him to success; and frequently he capped and uncapped his lens again and still again, until the gusts of wind passed by and comparative calm came over the scene. It must be remembered that the exposures were counted by minutes instead of seconds, in order to make all this intelligible to modern workers. The sky was almost invariably represented by white paper. There were a few, but only a few, who could not tolerate this blank, and clouds, more remarkable for their vigour than their truth to Nature, were painted on glass and printed in afterwards; but examples of their work were so few that they may be cited as exceptions to prove the rule.

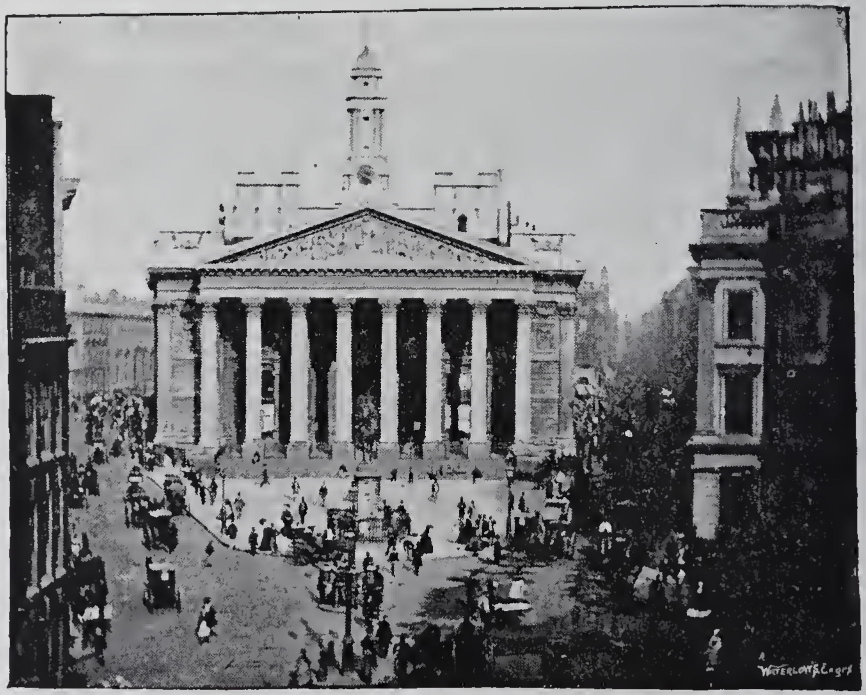
Seaside effects were scarcely ever attempted, for with both water and sky represented by white paper the effect—or rather non-effect—of the whole can easily be imagined.

It may therefore be conceived what an impression was produced on photographers of this period by the appearance of the instantaneous wave studies of Le Grey. Of course there were plenty of imitators, and in a short time results were seen which, if not equalling the original effects, ran them pretty close.

Le Grey's seascapes were produced about 1859, and Wilson followed in 1860 with his wonderful sunset effects for the stereoscope. These were so remarkably striking, that among others I became an imitator; and as I was then busy making pictures for the stereoscope I threw all my energies in the same direction, and a number of seaside studies and sunset effects were produced during the same year. England's instantaneous views of Paris were published in 1861.

Mr. Jerome Harrison has recently, in the pages of the *Amateur Photographer*, made a quotation from a paper read by me at the South London Photographic Society in 1861, and as it vividly recalls to my mind the enthusiasm aroused in myself, as well as many others, by these wonderful examples of a new departure in photography, I feel I cannot do better than give extracts from the paper here:—

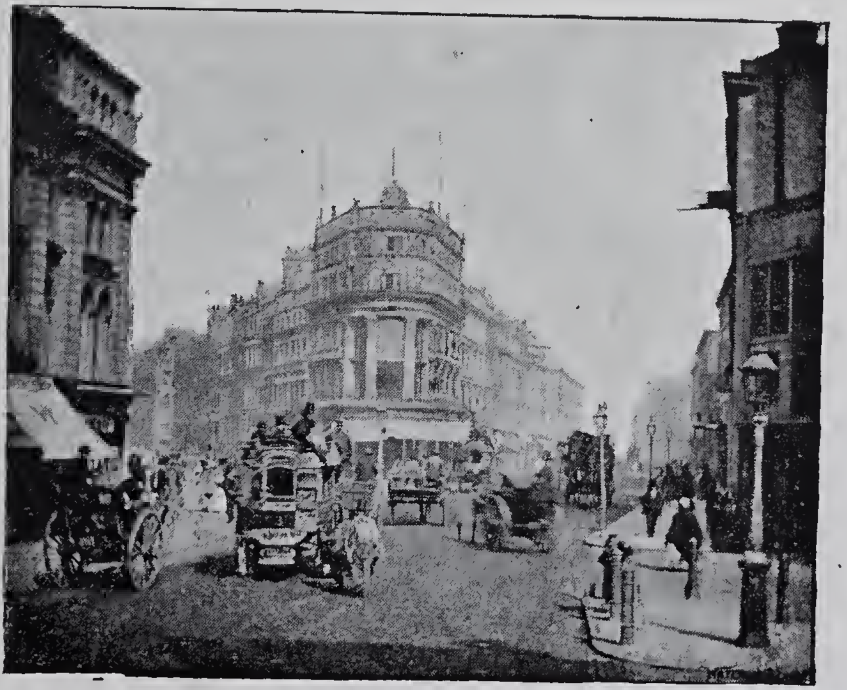
"All those who have beheld the instantaneous sea and sky photographs of Le Grey, and the glorious productions of Wilson of Aberdeen, must be impressed with the conviction that the future of artistic photography lies not in giving to the expectant world delicate primrose or white skies, with the hills so sharp in outline that the thought of the consequences attendant on a fall upon them makes us quite uncomfortable; middle distance, generally pronounced by the uninitiated to be ice covered by snow, and which only the connoisseur knew to be the photographer's hieroglyph for water; and the foreground made up of black masses to do duty for trees. Photographers of this class will soon be covered by the dust of oblivion. . . . Le Grey is the man who has spanned the gulf that separated photography from the fine arts. We regard him as the pioneer of the new era in photography, and Wilson and others have formed the advanced guard. When we look at Wilson's later productions and see that water—usually so imperfect and naked in photographs—can be produced with all its undulations, its thousand lights and shadows faithfully portrayed; when we see it proved that the sun—generally regarded as so fierce in some of his moods—has calmly looked on while the daring photographer has taken a sight at him, and has even smiled upon his efforts and left the impress of his beaming face upon the sensitive plate; when cloudy sky and stormy sea can be rendered with equal facility;—we cannot help feeling that the



THE ROYAL EXCHANGE.
Photograph taken in 1860.

future before us in photography lies in the perfecting of every means and appliance that can tend to make instantaneous pictures of every size easy of production."

Were it not that I am about to write of some of the difficulties incident to the imperfect methods of thirty years ago the photographic worker of to-day might with reason smile at this aspiration which now must appear so commonplace; but he must remember that "every means and appliance" is now perfected, and instantaneous pictures of any reasonable size are so easy of execution that certainly they do not call for any expression of astonishment. The mechanical part of the work is easy enough; but the infusion of art into the work done,—well that is another matter, and is apart from the purpose of the present article.



NEW OXFORD STREET.
Photograph taken in 1862.

Let us go back thirty years, and in imagination prepare for a short photographic campaign in pursuit of the picturesque. First of all, let there be due attention given to the "means and appliances," for, in taking the field, success depended largely upon a careful inspection of the sinews of war. Well, even for pictures of small dimensions the impedimenta assumed formidable dimensions. It was almost sufficient to fill a small baggage waggon. The knowing ones in those days always took care to have "rolling stock." In other words their photographic equipment went on wheels. But alas! too frequently wheels were unavailable. Of what use would wheels be to England in his Napoleonic or Hannibalian crossing of the Alps? or to Wilson on the lakes and fells of Scotland? Stern necessity demanded the pack-horse or ass in the form of a sturdy porter, and that porter only too frequently had to be the photographer himself. For instantaneous work dry plates were unavailable, for the dry plate processes then in vogue, such as the collodio-albumen and others of a similar kind, demanded half-hours instead of seconds. No; there was nothing for it but the tent with all its attendant horrors of dust and suffocation. The whole of the work had to be done in the field, and therefore everything necessary for the completion of the negative had to be carried; and woe to the careless photographer who omitted the "roll call" of apparatus before starting! Defeat would certainly follow.

Let us assume that everything necessary for the day's work has been properly packed, and we are ready for a start. The day is a stormy one at the seaside. Just the day, in fact, for grand cloud and wave effects. Some shelter must be found for the tent somehow; for it carries too much canvas to stand the force of such a gale in the open. At length we are lucky, and the tent is comparatively safe, so we proceed to put everything in order inside. The various bottles needed—and they are many—are in their proper places. The nitrate of silver bath is furnished with an air-tight top, so that its contents cannot spill. It is put into its light-tight well. The water tank is put outside, and a flexible tube carries the contents into the interior. Before we start we must have a fairly liberal supply of water. This may mean a journey of half-a-mile, for salt water will not do. Too frequently the cry was, "Water, water everywhere, but not a drop"—fit for photography. With fear and trembling we struggle with the ample—on a windy day too ample—folds of the drapery of the tent, and we are safely tucked up inside. We are pretty sure the tent is light-tight, our fears are not in that direction. Other matters more serious weigh upon us. Has the silver bath amiably stood the jolting, or has it got a fit of the sulks, and determined not to work ? For, strange as it may appear to the amateur of to-day, the bath was the constant subject of conversation between photographers of the time referred to ; and the state of the weather quite took second place. The bath was as whimsical and capricious as a woman, and you never with any degree of certainty knew how it was going to act. The plates had been carefully cleaned and dusted beforehand, and wisely so, for the air is heavy with salt spray. Our business is with iodide and bromide of silver, and we do not need the chloride furnished by Neptune against our will. The stopper had not blown out of the collodion bottle during its jolting journey to the scene of action, so we are able to pour the contents over the plate —and sometimes up our sleeve as well—and after waiting till the film has properly set, immerse it in the nitrate bath. So far all has gone well. The plate is carefully drained, and inserted in the dark slide, and we emerge half suffocated from our black hole. The camera is on its tripod, and we are ready for the start. Our journey is probably down the face of a cliff, for we had to seek shelter for the tent some distance from the shore. Now we feel the full force of the gale, and the legs of the tripod have to be well spread in order to keep the camera firm. Focussing is difficult, for the velvet somehow prefers to cover the lens instead of the head. The picture is somehow not as bright on the screen as it should be, but the moment is chosen and the exposure made. A hard climb up the cliff brings us back to the tent, and once more muffled up we proceed to develop. The appearance of the negative is puzzling, but perhaps it will look better when fixed. This we can do in daylight, and with cyanide of potassium it is soon accomplished. We were not wrong, there is mist, or fog, or something. What can it be? There is nothing for it but to prepare another plate. The same routine follows, and we are down the cliff once more. Again we proceed to focus. Now it is the camera that has gone wrong; we cannot see the image at all. An examination of the lens explains the mystery. The sea-spray has covered the front of the lens. More care is taken this time.

The Thames near Woolwich.
Photograph taken in 1862.

The lens is wiped just the moment before exposure, and after the fatiguing climb once more repeated we are perhaps rewarded with a fairly presentable negative.

An interesting question presents itself while dealing with the tent and its discomforts: Can wasps have been photographers in some former world? The interest in photographic proceedings displayed by them is truly remarkable. The moment the yellow window of the tent is opened an inch, just to admit a mouthful of air to the panting operator inside, as sure as fate in comes one of these gaudy yellow-and-black gentlemen to inspect the proceedings, and to express in his own peculiar way his opinion thereon. He evidently thinks the photographer deaf, and comes much too near the ear to be pleasant. Perhaps he is anxious to communicate some tip, well known to himself in other times, but new in these latter days. His language is distracting and incomprehensible, and so after a time he flies away in disgust only to give place to another of his fraternity the moment the window is once more opened.

The Thames near Tilbury.
Photograph taken in 1862.

A question will naturally suggest itself to the reader of the above. To what is due the increased rapidity which has made breaking waves and rapidly moving objects so easy of portrayal? Wet collodion and the nitrate of silver bath were the means employed both before and after the advent of Le Grey's breaking waves. There must be some striking departure from the usual method of working these materials to change the exposure of the plates from minutes to seconds. The liberal use of bromides as well as iodides in the collodion, and the employment of sulphate of iron instead of pyrogallic acid, helped enormously in giving increased rapidity to the exposure; but the greatest change was effected by the abandonment of the small stop, and the opening of the aperture of the lens to the very widest available extent. For the street scenes double combination lenses were employed; and it must be remembered that the size of the pictures was usually extremely small. The excessive definition, which made landscapes frequently more like maps than transcripts of Nature—so little was there of a suggestion, even of atmosphere—had to be given up; and though for some time many of the old school held fast to the old methods, still, in a few years, the rapid character of landscape photography changed, and greater softness and harmony were visible in the work exhibited.

In spite of all the fatigue and frequent vexation of spirit attendant upon photographic outdoor work of the period referred to, there were compensative joys unknown to the photographer of to-day. After waiting and watching for some particular atmospheric effect, the delight on escaping from the confinement of the suffocating tent, to find reward for all the patience in the shape of a successful negative, is an experience known only to the workers in the days of wet collodion. It is a pleasure unknown to the dry-plate worker of to-day. I am afraid if some patent fishing-machine could be invented, so that the angler had to take his boxed-up apparatus home and examine his "take" by lamplight, the piscatorial art of Izaak Walton and "Red Spinner" would rapidly become one of the lost arts.

I look back now with still tender remembrance on certain memorable days when unusual difficulties had been overcome and unusual success had followed. One comes to mind at the present moment. When I made my street views of London for the stereoscope, I used a darkened cab for my developing room and perched myself and camera on the roof when making the picture. Every fine day the same cabman came to know if I wanted him before starting for his usual day's work. He soon became very expert in pinning up the dark cloth used for the transformation of the cab into a laboratory on wheels. In starting for the day the route we took depended upon the direction of the wind. With an easterly wind it was useless to go westwards, and therefore we probably went towards the City. On several occasions I had looked with longing eyes at the Exchange and Bank of England from the corner of Cheapside, but the immense traffic appeared to make the selection of a suitable spot for the cab impossible. On a memorable day, when the City was unusually clear, I sighed when I came in sight of the desired view and I said to Cabby—for I always rode beside him on the box—how much I wished to make this particular picture, but that I thought it impossible. He was quite a character and remarkably ready-witted. In answer he said, "You get inside and be nimble, and I'll work it." With palpitating heart I went inside to prepare the plate; and during the time necessary to get it into the bath and afterwards into the dark slide, and which seemed an age to me, I heard a hoarse murmur from without which gathered force and resembled the distant roar of the sea. Presently I could distinguish the voice of Cabby, and heard the following: "He's a gentleman employed by Government, and we are going to the Tower after this. We start from the Horse Guards every morning. Just you watch him when he comes out. Won't he astonish you, that's all?" When I came out I found the cab in the middle of Cheapside, and the whole of the traffic stopped, and several policemen in attendance. With fear and trembling I mounted to the roof and made the exposure. As I came down Cabby, with great deference, said, "Shall I go on to the side of the Bank now, sir?" And turning to the police he said with triumph, "There, what did I tell you? Ain't it wonderful?" The picture was a success, and I went away a happy man.

VALENTINE BLANCHARD.

A PROPOSED INTERNATIONAL EXHIBITION OF PHOTOGRAPHY.

IN a general way, the advantages that could accrue from holding an International Exhibition of Photography, on a scale of sufficient magnitude to embrace every branch of the art-science that would demonstrate in a visible manner its various ramifications in mechanics, science, and art, and to which all nations would be asked to contribute, may fairly be assumed as being obvious to the majority of the Photographic Quarterly's readers, even without any prolonged consideration. We may, however, be pardoned if we invite them to give a more extended examination of the subject in all its bearings; for we venture to assert that an International Exhibition of Photography, to be held in London, is a project worthy of careful thought, from whatever aspect it may be viewed; for in the event of such a scheme achieving fulfilment its influence on the future of photography would undoubtedly be very marked, as it would tend to considerably increase its sphere of usefulness, enlarge the number of its applications, give an impetus to its æsthetic capabilities, and in every way promote the popularity of the art-science.

To be able, however, to correctly appraise the value of an exhibition on the scale now being suggested, and to apportion the influence that its prominent features could exert, the mind must be entirely freed from any prejudice against such displays which may possibly have been created by disappointment resulting from inspecting the uninteresting exhibits upon which many photographic exhibitions have had of late years to rely for their staple attractions. It must be conceded that their interests have chiefly been of a local or limited character, and generally centred around the stalls of certain well-known apparatus makers, and upon a few of the pictures which ambitious amateurs or professional portrait photographers had hung upon the walls. These exhibitions have undoubtedly fulfilled their intentions, the principal one having been the encouragement of amateur photography, in conjunction apparently with another one the distribution of a large number of medals, that, for all the use they are, might just as well have been scrambled for. With exhibitions of this character the one that it is proposed should be inaugurated, and which we are now considering, would have absolutely no affinity. Eliminating comparisons respecting size, scope embraced, and general purport, the far-reaching interest and comprehensive character of one to which all nations would be invited to contribute and every phase of photography would receive attention, should give it a character so entirely different from any exhibition that has hitherto been held that even the best of them would bear as little relationship to so gigantic an enterprise as a fish market did to the Fishery Exhibition at South Kensington a few years ago. Any comparison, therefore, that the reader may at first feel compelled to make regarding photographic exhibitions, resulting from past experience with their management, must in fairness be banished from the mind before due weight can be given to the value of such an exhibition as an International Exhibition of Photography, designed with the intention of being thoroughly comprehensive and completely representative.

An undertaking having such far-reaching objects in view must in order to fulfil its mission attain the highest standard attainable; its interest must therefore be made almost unlimited, and the profit and pleasure that can be derived from studying the contents of the various galleries must not be confined to any section or sections of the general public; in short, it will have to embrace within its scope the means of affording instruction and entertainment to every man, woman, or child that passes through its turnstiles. In this way only can it be made a success. And that such an exhibition confined to photography and kindred subjects is a feasible scheme and could be made to accomplish this result, we shall endeavour to satisfactorily establish, and to more particularly emphasise the gain to the world that might arise from such an undertaking.

Although the interest taken in photography may be said to be world-wide, for there can now barely be a family in any civilised country, from the highest to the lowest, who is not indebted to it for some pleasure or valued memento of friend or scene ; nevertheless a great deal of ignorance is prevalent regarding its powers, more particularly with respect to those to which various branches of science and art stand indebted for assistance. And this ignorance extends even into the ranks of the workers with photographic methods, for their information is often of a limited nature regarding the different means of accomplishing the same results that are characteristic of the different nations where photography is utilised for identical purposes. Certain theoretical and hazy notions gleaned from the periodicals of the day devoted to such subjects may be entertained, but the enlightenment that results from witnessing practical demonstration is most assuredly non-existing except among a very limited number. Now the value of correctly organised exhibitions as technical educators in science, art, or any handicraft, can hardly be disputed, for the marked advances that were noticeable in English handiwork and design after the International Exhibition of 1851, and that again followed the Exhibition of 1862, were undoubtedly due to the influence they had exerted on the public mind. In this way the clear judgment and far-sightedness of the Prince Consort were made evident, for the good work done by the first exhibition fully justified all the arguments he had advanced in its favour during his enthusiastic advocacy of the scheme.

Certainly it is impossible to over-estimate the advantages that might accrue from having for some period of time under one roof machinery at work demonstrating all the various photo-processes for mechanically reproducing photographs or drawings which are now in daily use, or which have been discovered but are languishing for lack of encouragement or means of being properly brought to the notice of the public. It is generally admitted that from some standpoint or another all these processes are at present imperfect, but in some of those whose methods are but little known the germ of the idea may lurk and be detected that will give some great development to this class of work, and the results may place the world as much a debtor to photography as it is to the printing press. Of course some of the processes are worked secretly, but the larger number are not fettered by any such restrictions. A little ingenuity brought to bear upon the subject would soon result in some arrangement being devised that would enable exhibitors to work portions of certain methods privately, and yet exhibit enough of the general manipulation to attract interest.

We think it will be universally admitted, therefore, that by providing the means whereby demonstrations of the different photo-mechanical processes could be witnessed, which are now being utilised the world over for reproduction and illustrating purposes, and by affording the means whereby a direct comparison of the results could readily be made, an exhibition such as the one being proposed could hardly fail to be profitable to those who are striving to perfect and give increased utility to these branches of photographic work. And in connection therewith it should be remembered that it is now an accepted fact that no more useful application of photography could be discovered than a method that will enable it to be readily used by the printer. The process of the future will be one that will reproduce, side by side with the letterpress, photographic illustrations, in which all detail will be clearly defined, half-tones well preserved, and justice done to the original picture by a perfect rendering of all the good qualities it may possess. The true value of accurate illustrations in educating the public mind and dispelling illusions will then become manifest. At present, although process work is largely utilised for book illustrating and pictorial journalism, the results are not generally of a character that can call forth any eulogium from the artistic standpoint; hence it has a limited application. If the proposed exhibition gave a stimulus to this branch of work, and had no other results, it would amply warrant its establishment.

Besides giving practical illustrations of all the process work, such as woodburytype, collotype, and kindred methods, photo-lithography, photo-zincography, and photogravures of all descriptions, other mechanical work connected with photography would be found but very little, if any, less interesting. The various systems employed in coating plates, films, and printing papers, the manufacture of the chemical compounds photographers require, the making of apparatus, and the highly skilled work necessitated in the grinding and polishing of lenses, would invite inspection. And careful attention to many details in connection with portions of the work that would be seen in this department, would result in an extension of information, regarding certain subjects, about which a great deal of ignorance is now prevalent.

To make the exhibition a true exponent of the photographic art all the different stages through which it has passed, from its earliest inception to the present state of perfection, would have to be practically illustrated, in as able a manner as circumstances would permit, and to do this correctly it might be found judicious to temporarily revive some of the various methods now relegated to ancient history. In any event loans from certain collections of early work which are known to be still existing would have to be solicited, and this section of the exhibition, owing to the historical interest of its display would doubtless be one of the most popular, for by a proper arrangement of the exhibits the upward progress of the art, step by step, could be very clearly shown. That this feature alone of the collection would make it an attractive one, is beyond a doubt; but in connection therewith it must be remembered that many of these early examples of photography were exceedingly beautiful, and as things of beauty are said to be joys for ever, certain exhibits would in this department, apart from their historical importance in the chain connecting the present with the past, have an individual attraction for all lovers of the beautiful.

In the art galleries the interest of all classes of visitors should be catered for, as the subjects that might therein be embraced are almost endless. Photographs of scenery characteristic of the different parts of the world should there be on view, as well as portraits of historical personages, of noted beauties; in fact, of renowned men and women of all countries who have lived within the present quarter of a century. Moreover, photographic reproduction of the most noted works of art contained in the various galleries of Europe, arranged country by country, ought certainly to be comprised within this portion of an exhibition of the comprehensive character proposed. Architecture also offers scope for the creation of a gallery wherein the works shown could defy excelling by any other known art. The different styles of the different countries and different periods, as exemplified by the views of the most beautiful buildings now extant and their interiors, could alone, without any other adjuncts, justify an exhibition and give it a deserved popularity. The minute details of architecture that, blending together in harmony, give beauty and magnificence to the whole, can have no better illustrator than photography, which is essentially the art *par excellence* of fine definition. The noble cathedrals of this and other lands, the ruined castles, the noted palaces, the stately mansions, and the country cottages are subjects for photographic pictures which always vie in popularity with any other class of photograph.

Further, a gallery might be appropriated for the purpose of exhibiting the cream of amateur and professional work of all countries, and by the exercise of a judicious supervision of the pictures sent in, the walls in this section could be covered with photographs of an interest far beyond anything in this way London as yet seen, for the collections from which the chosen pictures would be culled, it is fair to assume, would be far more extensive and representative of the world's photography than any previous exhibition could possibly have attracted.

As an exhibition on the scale we are now contemplating should be as comprehensive as human ingenuity could make it, the scientific departments in which photographic aid is now requisitioned, would have to contribute their share towards the general display; and the interest that would attach to this portion of the exhibition would be beyond calculation, for the practical application of photography to astronomy in various ways, to natural history, physiology, medicine, surgery; and the marvels that result from wedding the camera to the microscope would here receive illustration. In connection with this department lectures and demonstrations ought most assuredly to be held from time to time in a hall which it would be the duty of the executive to provide for this and similar purposes. For it can hardly be gainsaid that at present only a very limited portion of the general public have any knowledge whatever regarding the wonders that can be revealed by the utilisation of photography in the loftiest regions of science, and the attractive way in which the results can be shown to large audiences. To many thousands of visitors who would be attracted to these lectures, the portrayal of these hidden mysteries of the world, and the explanation of their influence upon mankind, would come as a perfect revelation of the most startling character.

Another branch of photography which is gradually becoming of importance might from such an exhibition receive an augmented encouragement, namely its utilisation for military and naval purposes in connection with surveying, ballooning, and other useful applications for staff purposes.

There are, of course, a great many other departments, both from artistic, scientific and mechanical points of view, which should be invited to contribute, but in the rough sketch of such an International Photographic Exhibition as the one in contemplation which we are now endeavouring to give, the minute details are not required, but would doubtless be filled in by any executive committee that might ultimately be formed to carry out the scheme. Enough, we think, has been said to show that from all and every aspect such an exhibition would have an extraordinary interest, not only for disciples of the photographic art but for scientific men of all shades as well as for the general public.

The fact cannot be overlooked that to carry out this project in its entirety, and in a manner that would be attractive, a large outlay would be necessitated. In order, therefore, to be certain that the expenditure would be balanced by the income, additional attractions for the public ought possibly to be supplied. With this object in view the optical lantern, with its numerous applications, could easily be employed to an advantage never before possible; and its powers of interesting and attracting the British public are beyond question. In addition, the usual military bands, promenade grounds, illuminated fountains, and brilliantly-lighted gardens, which are now considered indispensable adjuncts in drawing the public to exhibitions, by making them pleasant summer evening resorts, would have to be provided; and in return it is only fair to assume from past experience that by these means people would be attracted daily to the place in sufficient numbers to make the venture a success from a financial point of view.

Dotted about here and there in the grounds studios might be erected for the taking of photographs in various methods, and where demonstrations of particular processes in connection with the art might be given, or lessons in photographic manipulations by competent men be allowed, and their rental would without doubt considerably augment the revenue.

Moreover, it has been suggested by Mr. Maskell, with whom the writer has conferred, and who has not only contributed many practical suggestions regarding this scheme in the various conferences but has already done a great deal of initial work in connection with it, that in order to give the exhibition an individuality, and in its general aspect a marked characteristic of its own, the galleries should be well and æsthetically furnished, their decorations made highly attractive, and the comfort of those who patronised the place studiously catered for. The public would undoubtedly appreciate this consideration for their comfort, in a manner that would recompense any extra expenditure incurred in this way. Moreover, it would demonstrate the fact that photographers can give a practical proof that they are imbued with the principle of good taste, and that they are aware of the change which has taken place in the public appreciation of refinement, comfort, and elegance, when supplied by those who cater for the pleasure of the masses,—a fact which previous exhibition committees have signally failed to comprehend, as they have to understand the influence which such things exert in giving popularity to enterprises of this character.

An influential but small committee has already met at the invitation of Mr. Maskell and the writer, to discuss the holding of an International Photographic Exhibition, and therefore an initial impulse has been given to the scheme. Its feasibility, however, depends on the support of those who can see the benefits and varied advantages that could accrue from such an exhibition, and would give the requisite assistance to any executive committee appointed to control its management.

Of course there are difficulties in the way, and so there have been in connection with every enterprise of a similar nature; but there are none that cannot be conquered if the enthusiasm of the vast army of photographers, professional, scientific and amateur, can be aroused on its behalf. The two principal obstacles to be overcome before such an enterprise can be launched are the securing of a suitable site, and the procuring of a guarantee fund to which subscribers of good standing have signed for an amount ample to protect those who become responsible for the initial outlay. Once these two matters are satisfactorily arranged—and they are by no means insurmountable, or if they were no exhibitions would ever be held—all other arrangements would be comparatively easy; and if this one has for an ulterior object the providing funds by the donation of its profits towards the foundation of a Photographic Institute, we venture to assert that our brethren with the camera will do their utmost to further the scheme of an International Exhibition of Photography, and in that event its success will be assured. J. Fortuné Nott.

NOTES.

THE Frontispiece in this number is a reproduction of one of the series of photographs exhibited at the recent Exhibition of the Photographic Society of Great Britain by Mr. S. N. Bhedward, which represented the "Feast of Roses," a festival held in the Vale of Cashmere, and, as we said in our last issue, mentioned by Moore in the "Light of the Harem" The picture we have selected is "Confidences." It makes a fit companion to the previous illustrations in the QUARTERLY.

At this season of the year many workers in photography set themselves to work to amuse and instruct by means of exhibitions of lantern slides. Much pleasure is afforded to our poorer brethren by this means, and it has given us some pleasure to notice that Mr. W. T. Stead, with the enterprise that is so characteristic of all his actions, proposes through the influence of the *Review of Reviews*, to start a "Magic Lantern Mission." He is kind enough to say:—"The article which I re-published in an early number of this *Review* from the PHOTOGRAPHIC QUARTERLY set me a-thinking." He then proceeds very fully to draft a scheme, and sums up the need of it in an able article from which we take the following headings:—

"The Magic Lantern in Church;" "Its use as an Evangeliser;" "Wanted, a Magic Lantern Edition of the Bible;" "The Picture Gallery of the Future;" "What is already being done;" "The Magic Lantern in the Mission-field;" "Illustrated Missionary Lectures;" "The Church Missionary Society;" "Recreative Evening Schools Association;" "The Lantern in the Street;" "The Lantern in the Workhouse."

This scheme if it is carried out—and Mr. Stead does not often put his hand to the plough without cutting a furrow—will owe its origin to Mr. C. H. Bothamley's article on "The Optical Lantern as an Aid to Teaching." The following closing paragraph we commend to the serious consideration of the readers of the QUARTERLY:—

"By far the most important thing is to discover the men and women in each district who are willing to devote, say one hour a week in the winter months, to this Mission of the Magic Lantern. Given but one such in each parish and all the rest will follow. Who are they who will volunteer as Missionaries of the Magic Lantern? A great work lies before them, and one which, adequately carried out, will amount to a new and far more popular system of University Extension Lectures than any they yet dreamed of either in Oxford or Cambridge."

Those who practice photography can, if they will, do much to help the movement.

A very admirable exhibition of photographs has been held in the rooms of the Royal Academy Galleries, Edinburgh, under the auspices of the Edinburgh Photographic Society, one of the oldest in the kingdom, and possessing a very considerable number of members. The Society succeeded in securing a large number of entries, some 1,200 frames, and, in addition, a most unique collection of historical photographs and photographic apparatus, the work of the "Fathers of Photography." On certain evenings in the week papers have been read, demonstrations given, and views projected by the optical lantern. The Society have reason to be proud of the exhibition, but we fear they must have sustained considerable loss owing to the very severe and wintry weather that has prevailed.

The article published in this number of the QUARTERLY, from the able pen of Major J. F. Nott, on a proposed International Photographic Exhibition, will be read with much interest. Photography has now become so universal, is of daily service to the artist, has revolutionised illustrated journalism, and has its uses in connection with every scientific and commercial project, that the time has come when there should be gathered together under one roof examples of all the capabilities of the art-science. It is hoped by the gentlemen who have taken the matter up that support and patronage will be given to the movement as ungrudgingly as was the case upon the promotion of the Inventions, Colonial and Fisheries Exhibitions. All interested in photography will, we feel sure, extend a helping hand, especially as the profits are to be set aside to aid the establishment of a Photographic Institute, which was discussed at considerable length in the columns of the *Amateur Photographer* last winter, and which is now claiming the attention of the Council of the Photographic Society of Great Britain, who are hopeful of securing financial help from some of the City Companies. The Photographic Institute is now really a necessity, and is as deserving of a Royal Charter as any of the sciences that have been so honoured.

Chromo-collotype work is slowly making strides, and we were pleased to notice in a recent number of the *Chase*, an excellent journal devoted to "Sport and Art," that two whole-page illustrations were reproduced in chromo-collotype from negatives by Mr. Teasdale Buckell.

A grumble reaches us in regard to the Photographic Exhibition to be held at Vienna. In England it has for some time been an accepted condition that the whole of the work in connection with the production of a photograph entered for competition shall be the entire work of the exhibitor. It would appear that at Vienna such conditions do not obtain, and our English amateurs will probably compete against Austrian ladies and gentlemen who expose the plate only and someone else does the rest. This is not satisfactory, especially as the exhibition has been upheld as a model for us to follow.

It is a very pleasant thing to record the continued advance of the Camera Club. The club has been established about five years, and has been an unbroken success from its opening. This month the club take up their quarters in their own club-house in Charing Cross, which has been erected in accordance with the wishes of the Committee, and the special requirements of a club of gentlemen interested in photography. Much assistance has been rendered in attaining this end by the valuable services of Mr. J. Gale, F.R.I.B.A., who has acted as honorary architect. The club will be complete with all the appointments that five years' experience has proved are necessary for a club such as the Camera Club, which combines the requirements of photography with the comforts and attractions of a social club. It was, of course, to be expected that when the Committee were in a position to give so much more that the question of increasing the club dues should be brought up for consideration; this was done at a recent meeting with the result that the town subscription has been increased to £5 5*s.*; country, £2 2*s.*; and foreign, £1 1*s.*, per annum. A concession will be made in favour of the first hundred members elected since the first of January; these will be admitted for an annual subscription of £3 3*s.* town, and £1 1*s.* for country members.

The club-house is not yet complete, and the severe weather has prevented much important work being proceeded with, especially in connection with the dark-rooms, of which there will be several fitted up in the most approved manner. We have no doubt that when we publish the April number of the QUARTERLY, everything will be finished, and we shall then again refer to the subject.

Two important papers, both bearing upon the present aspect of photography and the position of the art, have been read quite recently; the first, entitled, "Some of the Tendencies in Photographic Art," was contributed by Mr. Philip H. Newman, and read by him before the members of the West Kent Amateur Photographic Society, and since its publication in the photographic journals has elicited much comment.

The following few extracts are worthy of notice in these pages. Speaking of the recent exhibitition, he says:—

> "Firstly, it seems to me that this exhibition was an epoch-making one, because it emphasised new departures in several directions which the next exhibition must advance, or stultify itself as to its present leading. These new departures are principally in reference to printing processes. The old albumen silver print is becoming rapidly a thing of the past; it lingers here and there, unmedalled, on the walls; and it may not be prophesying too much to say that in the next exhibition it will be extinct, and that, for better or for worse, platinum and bromide will hold its place. Another new departure that undoubtedly will be more greatly in evidence in the next exhibition than even in this, is rough surfaced paper, as used in most of the new processes. . . . The general belief is that the works, 'Dedham Lock,' 'Dedham Bridge,' and the 'Old Farmstead,' by Messrs. Davison and Clark, owe their charms as much to the merits of the printing processes employed, and the accentuation of an out-of-focus motive as to other characteristics; but it is precisely here that we must distinguish between success and failure. The choice of subjects, composition, and all that technical excellence can give, with one exception, are eminently pleasing and satisfactory, promising artistic and interesting pictures; but this exception in their negatives, emphasised especially in the case of Mr. Davison in his printings, indicated that these gentlemen have thrown away the substance, so to speak, for the shadow, and are satisfied by a result, which, because it gives a more or less close resemblance to a second-rate sepia drawing, is deemed artistic.
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> "But I think I hear you say: Oh! don't you like rough paper, then, and fuzzy prints, and sepia tones? Personally, I do like the rough and fuzzy effect. . . . Would the pictures of Peter de Hooghe, Van der Heyde, or other painters of detail, charm us, did we see the lines in the canvas, falsifying by their light and shade the drawing in their work? Of course the reverse of the proposition holds good, and we are none the less displeased with a smooth hard surface in a large wall painting or fresco. Roughness or granulation here gives life and brilliancy, and at the same time a sense of vagueness, which the eye is doubly charmed to correct for itself, and complete our artistic satisfaction. Roughness of surface then is, as I have said, a matter of scale in all cases, and a scale which we must naturally apply to the works in the recent photographic exhibition, and I fear very much in their disfavour: for we shall see the structure of the paper in many instances asserting itself before we have time to enjoy the pictures. . . . Now it is, of course, very interesting to see such a very successful work as Mr. Davison's pinhole picture, but it must be remembered that if the rule of scale applies to roughness of paper proportionately

with the size of the work, to be consistent, it must equally apply to vagueness of outline from any other cause; indeed, such as the pinhole gives. The question then arises, Does Mr. Davison's pinhole picture justify this vagueness in point of size? I am afraid we are driven to the conclusion that it does not, and quite apart from the considerations of whether under any circumstances excepting the necessity of the case where a lens is not obtainable, or for an experimental *tour de force*, a pinhole is desirable at all, or whether in the nature of things it is desirable to have photographs excepting of limited dimensions? It is more than questionable whether fuzziness is not entirely out of place, excepting in very large scenic work in landscape, and only tolerable in photography at all in life-sized portraiture. . . . Assuredly the works of these gentlemen, however successful they may be in one respect, distinctly fail in another, and which I point out as being based on an artistic misconception, and against which every amateur should be warned. . . . The roughness or smoothness of surface of a work of painting, printing, or photography, is simply a question of scale, argue the matter out as you may, it always comes to that.

"Let no one persuade you to the contrary, the use of a rougher paper than the area of your print justifies is an affectation, and a sin against good taste. That you may be the more readily convinced that this dictum is neither arbitrary nor empirical, let us look at the subject for a minute or two from a very common-sense standpoint, and I will ask any one with ordinary eyesight, how far he places a photograph or other object from his eyes when he is looking at it for ordinary purposes, viz., to be pleased or refreshed by its artistic suggestion, or the memories it may recall—I say its ordinary purposes? I shall be answered, the distance referred to is generally rather less than twice the length of the greatest diameter of the work under inspection. This being so, I will further ask the person inspecting the work at that ordinary distance, if he, or she, desires to see the undulations in the texture of the paper, or surface, before, or simultaneously with the subject under view; whether the ribs and marking in the structure of that paper, or surface, contribute in any degree to the enjoyment of the picture? No, I shall be generally answered not at all, but rather, that the lines and markings militate against that enjoyment, distract the eye, and withdraw in some measure the attention from the picture, or subject, whatever it may be. . . . We are all charmed by a chalk or charcoal drawing because of this transparency in the shadows, given equally by diagonal lines, as by roughness of surface, and it is of course wished to realise this charm in photography if possible. Since the introduction of the carbon process especially, photographers have been further stimulated by the reproduction of drawings, etchings, and engravings, and they wish to obtain similar artistic results directly from nature. We must, however, be content to wait for this until a satisfactory process is invented, for it must be allowed, I think, we have not quite got it yet. Another reason for our anxiety shows a little human weakness. We are disgusted when we hear that paralysing phrase 'a mere photograph.' Let us admit at once that this is weakness: should we not rather be proud of our mere photographs? Is not the exhibition after all but an exhibition of mere photographs? At least no exhibit can be the grander by affecting to imitate some other form of art; the art of making a photograph is none the higher for making it imitate a second-rate sepia drawing. . . . Firstly, we have seen, I think, that the best negative may be done ill justice to by injudicious printing. Secondly, that obscurity and negation of sharp

> focus or reasonable definition, does not necessarily imply fine art. Thirdly, that the grain of the paper used in printing should not be a matter of fad, but is seriously and actually a matter of absolute scale. Fourthly, that exaggeration and affectation is an affront to ætheticism and pure taste."

Mr. George Bankart, President of the Leicestershire Photographic Society, writing to the *Amateur Photographer*, says of Mr. Newman's paper:—"From it a decalogue of axioms might be culled, which ought to be printed in letters of gold and hung up in the meeting room of every photographic society in the kingdom; a lecture almost every word of which sinks into one's soul with a feeling of restful satisfaction that the whole duty of a photographer should be made so plain." We give this as showing what an amateur worker of many years' standing thinks of Mr. Newman's paper.

The other paper of importance was read by Mr. George Davison, whose works are referred to by Mr. Newman in the foregoing quotation, before the members of the Society of Arts, and was entitled "Impressionism in Photography," a paper on which much thought had doubtless been expended, but there is much that to us appears irrelevant to photography. There are few, we venture to say, who have any desire to see photography used as a medium to imitate the pictures of the Impressionist School of painters. He writes:—

> "Photographers have previously been rather inclined to accept the slur commonly cast upon their means and results as mechanical, and have exaggerated the limitations which their tools and technique impose upon them. They seem to be unduly influenced by the patronage of some classes of painters, who have despised and contemned photography, partly with justice, seeing the average published results, and partly through ignorance of its possibilities. Photographers have accepted this degradation of their art, and have even joined voice in deprecating any reform or movement which promised better artistic expression as 'apeing the conventionalities of painting.' For example, some of the photographers of the older conventions have latterly objected to any but the most limited use of focussing for expressing the relative interests of a picture, and have even insisted that definition is the distinctive characteristic of photography. They have inveighed against rough surfaced prints as being in imitation of sepia drawing, appearances presumably held to be the sole privilege of the brush workers, and, whilst claiming for decorative, historical, imaginative, and symbolical painting the highest credit of art, they have disclaimed for their own medium any power or province in such work. Mr. Stillman holds that photography can have no place in art because design is impossible to it, and design he seems to define as 'deliberate arrangements' carried out by hand. Mr. Pringle denies the possibility of what he terms 'fine art' to photography, or at least to any but combination photography by the peculiar distinction that he lays down when he says, 'Art obtains where a painter simply paints what he has before him. This is not fine art.' Mr. Gale finds the greatest happiness in what he alludes to as a transformation of nature and 'those ideal representations which are the perfection of art,' and, in this reference, he instances Turner's 'Storm.' Mr. H. P. Robinson approves and seeks to justify a wilful opposition between art and nature, and he goes with Mr. John Brett in demanding an improvement of nature, an exaltation of natural appearances, and an accentuation of beauties in pictorial representations, a position, perhaps, intended to justify combination printing. . . . Turning to the general contention that photography is merely mechanical, this cry may be answered by a reminder that so may brush-work be mechanical; and

it is sufficiently answered, I think, by the fact that the work of various photographers is as distinctively individual as obtains in regard to painters. Even leaving figures out of the question, two photographers separately treating the same subject will produce two impressions almost, if not quite, as different in qualities as would two impressionist painters in monochrome. It may be said that the painter is freer to generalise, emphasise, and analyse, as he may please; but if this is said of an actual scene in front of the artist, it must be remembered that the lens, as used by a trained observer, sees very much as the eye sees; and, that most of the suppression and selection possible to a painter genuinely consulting his impressions is also at the command of the photographer. Unnatural emphasis may please a certain school, but it will not bear comparison with nature, and it will in time have its proper value assigned to it. It is also said that one photographer can easily proceed to take exactly the same picture that another has achieved. Well, I do not think it has ever been done yet in respect of any photograph worthy of the name of picture. And supposing it is so, cannot the painter copy the work of a fellow-artist? The mere fact of the means including more mechanism is not a disadvantage if the result be more truthful and life-like. . . .

"In regard to focussing, again, there are, similarly, misleading conventions which prevent the free and general use of the full powers of photography. We still hear repeated the doctrine that minute definition is the distinctive quality of photography, and that, therefore, this should be made the most of in artistic work. Even if it were, it would be sufficient answer to this that such definition is not the distinctive characteristic of *seeing*. But definition is no more the distinguishing feature of photography than is exaggerated perspective, or, indeed, want of definition than is diffusion or softness. This depends upon the instruments used. We are told that in any broad treatment by focus we are imitating the natural characteristics of a certain school of painting. It might with equal force, or no force, be alleged that those in favour of minute definition are, in their sharpest tendencies, apeing the characteristics of the old miniature workers. Whether in painting or photography it is purely a matter of the instrument used and the use made of it. In the one, either a fine point or a broad brush may be used. In the other, the optician's idea (a scientific aspect) of perfection in a lens is surely not expected to sway those bent on giving æsthetic pleasure. Everyone has seen that so-called mathematical accuracy is not necessarily artistic truth. Nothing but what observation or science can establish can be adopted as a principle by a naturalistic photographer. That the eye with one point of sight sees in different focus near and distant objects everyone admits; within what limits and with what differentiation is not so clear. . . .

"A not unimportant consideration, bearing in some measure both upon the matters of values and definition, is the printing medium employed. I find, in the newest extra rough-surfaced papers, very excellent and distinctive qualities, in respect particularly of breadth and luminousness. Some extraordinary objections have been taken to the results on these papers as not being photography because they bear resemblance to wash-drawings; and one gentleman finds in this, and the character of diffraction photographs, an opening of the door to any and every kind of brush-work upon the print. But the answer is, first, that there is no aim to get wash-drawing appearance; and, secondly, all the process is pure photography. Both the photographer and the painter have the same aim, and it is not surprising if printing upon the same papers produce similar results, for photographic deposit more resembles painted surfaces than any other method. Both work in tones, or shades of monochrome, and both may be worked upon any medium which promises to give more truly and more effectively our impressions of nature. In some respects, the use of these rough papers, which are only now likely to become general for artistic work, constitute one of the greatest advances yet made. There is almost as great a superiority for most subjects in the new platinotype paper over the ordinary platinum surfaces, as there is between these latter and silver printing. These extra rough surfaces I consider the best printing medium that has been introduced, not excepting reproduction of the negative upon a copper-plate or photo-etching. . . .

"Concerning photographs bearing somewhat the naturalistic character, that is, with truth of tone and suppression of unnatural detail, it is no uncommon thing to hear it said, 'Oh yes, they are artistic enough, but they are not photographs.' Such is the domination of conventional views. I believe, indeed, that some of our friends are prepared to accept this view, and we have an ingenious suggestion that as there are painter-etchers so there should be painter-photographers, a name to be accepted, I presume, either on the *lucus a non lucendo* principle that all painting is rigidly excluded from their plates and prints, or to proclaim that they gladly admit the soft impeachment that their photographs are guilty of looking like sepia drawings. . . .

"Nature will never go out of fashion. Prejudice will fade, and even one generation ahead will find the value of photographic portraiture, if it be natural and permanent, as it may be. The prospect is worthy of work, devotion, and sacrifice, and, in our enthusiasm, we may be forgiven for indulging visions of a time when, with Truth and Nature as its watchword still, photography shall have taken to itself such glorious attributes, that with fewer limiting conditions, our every impression of the visible world, light, colour, action, and form will come within its scope to express."

The reading of the paper did not lead to any very lengthy discussion. Mr. J. F. Moulton, Q.C., said that he sympathised with the reader of the paper, who claimed for photography a place amongst the means of artistic production, and if photography did not come forward boldly and make the claim, it would never receive its proper recognition. Many people seemed to think that a picture which was blurred, either by rough paper or bad focussing, was a step in the way of art, but he could not agree with them. It was not more beautiful, and certainly was not more like nature. No one with real artistic taste would allow himself to be deceived by mere imperfect work.

We have quoted at considerable length because the papers are both interesting and instructive, and the PHOTOGRAPHIC QUARTERLY would be incomplete without a full notice and general outline of the opinions of two men so able to speak upon photographic art as Mr. Newman and Mr. Davison.

An interesting article is announced to be published in the *Art Journal* on "Recent Photography," which will be illustrated with reproductions of several photographs exhibited at the Photographic Society's recent exhibition, viz., "Through the Driftwood to the Fold," by J. Gale; "La Belle Bretonne," by Arthur Burchett; "Hoar-Frost Scene," by Paul Lange; "Corbière Rock at Half-tide," by A. R. Dresser; and "Off to the Seaside," a view on the smoky Tyne, by Lyd. Sawyer.

Photographic prints have been extensively adapted as Christmas and New

Year cards, in many cases with considerable success. Hoar-frost scenes have been very popular amongst amateur workers.

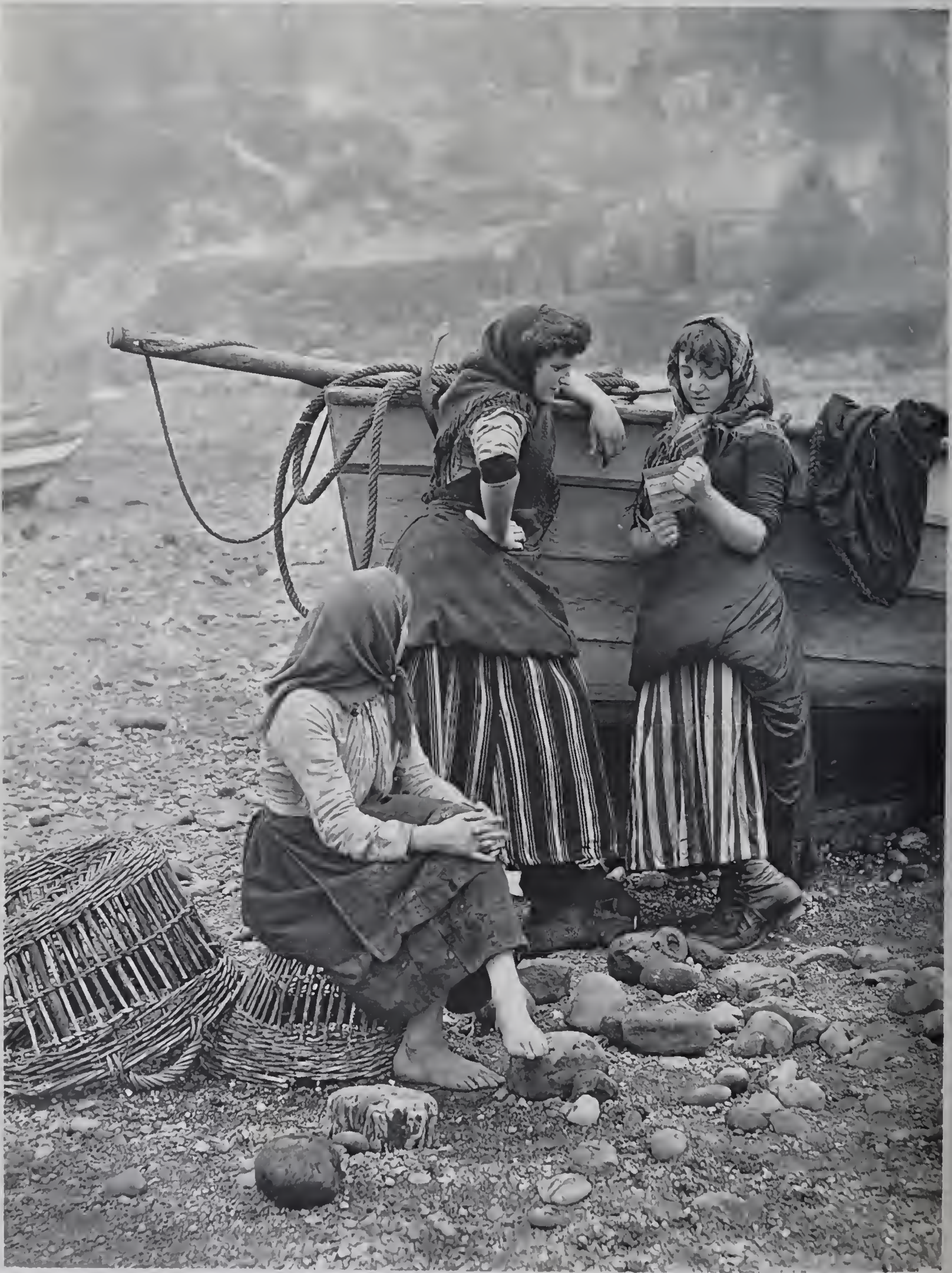
At the last meeting of the members of the Society of Chemical Industry (Liverpool Section), the paper recently read by Dr. F. Hurter and Mr. V. C. Driffield, on "Photo-Chemical Investigations," was discussed. The first communication was from Captain Abney on "Grease Spot Photometer Measures," in which the writer upheld that the measurements with the shadow photometer were consistent in themselves, whereas those obtained by Messrs. Hurter and Driffield were much higher in all cases. These gentlemen maintained the accuracy of their measurements, and sought to show the errors in the use of the sector or grease spot photometer. It will be remembered that the full text of the paper under discussion appeared in the photographic journals some few weeks since. At the same meeting another paper was contributed by Messrs. Hurter and Driffield on "The Relation between Photographic Negatives and Positives," illustrated by a series of interesting experiments.

We understand that the 1891 Liverpool Exhibition promises to be a marked success. Mr. T. S. Mayne, the Hon. Secretary, will be glad to forward entry forms to those who may not have received them.

Dr. P. H. Emerson has just had published for him, by Messrs. Sampson Low & Co., an admirably got-up book, "Wild Life on a Tidal River," which is extensively illustrated with photogravures from the author's negatives. The letterpress is written in a bright amusing strain, and tells of the adventures and pleasures of "roughing it" on a tidal river.

Nothing new of importance in apparatus or photographic appliances has come under our notice, except a new lantern plate by the Britannia Works Company—the "Ilford Special Plate," which gives very excellent black tones, and, although only very recently introduced, has a considerable sale.

Rough printing papers are now much used, and a very much larger proportion of photographs that come under our notice are upon matt surface paper, either silver or gelatino-chloride. Very few amateurs now use silver albumenised paper, and if the photographs exposed in professional photographers' show-cases are a criterion of public taste, the glazy surface of silver prints is a thing of the past.



Woodburytype Co.]

[J. E. AUSTIN.

"THE LOVE LETTER."

(MEDAL, PHOTOGRAPHIC SOCIETY OF GREAT BRITAIN, 1890.)

THE

PHOTOGRAPHIC QUARTERLY.

EDITED BY

CHARLES W. HASTINGS.

(Editor of "Amateur Photographer," "Photographic Reporter," &c.)

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THE

PHOTOGRAPHIC QUARTERLY.

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THE CAMERA'S SERVICE TO ART.

THE services which photography has rendered to art are so substantial and far-reaching, it is to be regretted that artists should view photographic art—photographic science, I should say, for the phrase is a far more accurate one—with any kind of jealousy or mistrust. No real artist would or could entertain such a sentiment, were it not for the very natural irritation for which the ignorance and stupidity of the general public must be held responsible. It is not only the merely vulgar and illiterate, or the unlettered middle class, or the Philistines in high places who insist upon confounding the achievements of photography with the creations of art; but men of the first culture, using the word culture in its conventional sense, idly permit themselves to harbour the error. Hence the artist's impatience. As for the rank and file among painters, their hostility is easily to be understood. It is merely sordid and commercial. They are not altogether blind to the fact that one good photograph is worth a whole gallery of bad pictures. The former has a distinct value, the latter have no value—a negligent and an inconclusive way of putting the case, seeing that bad pictures are not simply valueless, but that they have a distinctly hurtful tendency. The community is injured morally and intellectually by the obtrusion into its midst of meretricious and unworthy art—*pseudo*-art, I should say.

This dictum I will justify in passing, so that I may not be misunderstood. In a certain sense pictures which are not art may have their uses; it is only when they are made to occupy the place of true art, as they frequently are, that they become hurtful to the community, in that they place before it a low ideal. The larger public finds more to interest it in pictures of the Universal Provider brand and in the average Royal Academy "pot-boiler" than in the works of the standard masters at the National Gallery. In the same way opéra-bouffe and burlesque have greater attractions for the general public than the plays of Shakespeare, Molière, Sardou, or Ibsen. So let it be. *Parvum parva decent.*

It must never be forgotten that the *raison d'être* of a photograph is quite other from that of a work of art. Photography registers facts, keeps memory green, stimulates creation, helps the artist to acquire knowledge—to educate himself, in fact; in brief, it is a means to an end. A painting is an end in itself, and as Mr. Whistler has said of a true work of art, it is finished from the beginning.

To entertain the fancy that photography can ever, in any way, rival art or make pictorial art superfluous, as so many simple-minded folk do, is as insane, as much "a fond thing vainly imagined," as to regard a verbatim report of a trial as a work of art, let us say a trial for murder, with a descriptive narrative, however well done, of the progress of the trial, the scene in court, the appearance and manner of the *dramatis personæ*, together with a picturesque account of the environment of the human figures. In this connection the word art is used, of course, in its highest and more legitimate sense, which implies something created. Naturalistic descriptions have value as naturalistic paintings have value, as rough notes, as storehouses of accurate facts from which, in the one place, the poet and romancist, in the other the poetic and creative painter, can draw. But a great poem, romance, or picture bears the highest truth to life and to nature, in that it is first evolved, then created and delivered to the world out of knowledge germinated by sentiment. John Ruskin has said: "All art worthy of the name is the energy—

neither of the human body alone, nor of the human soul alone, but of both united, one guiding the other: good craftsmanship and work of the fingers joined with good emotion and work of the heart. Without mingling of heart-passion with hand-power, no art is possible. The highest art unites both in their intensest degrees: the action of the hand at its finest, with that of the heart at its fullest." Thomas Woolner expressed this idea even more tersely when he said: "Art is a happy marriage of science and sensibility, knowledge and passion." Here we have an ampler meaning; for craftsmanship however perfect, love however intense, must have a great body of actual knowledge of the nature of things with their component parts, in order that work may be produced which will satisfy the highest critical judgment. To see things poetically is the first desideratum, but the artist must show that he knows about them as well as feels about them. Photography has not only increased this obligation which has ever been imposed upon the artist, it has given him the means whereby he may acquire the definite and accurate knowledge which it is necessary for him to have.

To produce a great work of art, mere selective acuteness will not serve; he who would aspire to add anything to the sum of the beautiful must also possess synthetical, or rather eclectic, ability; he must not only know what to take, he must know what to leave, and, above all, what to add. The man who can be satisfied wholly and unreservedly with what he sees in nature, is minus the first essential of the artist. Some erroneously suppose that the artist's *métier* and mission is merely "to copy" Nature, to give to the world something as beautiful as may be seen in nature. He who runs may read, and if this were so, why not leave Nature to tell her own story? The obligation of Art is not so easily discharged. We have a right to ask from it that it should supplement Nature, that it should make into a thing of beauty that in which we have seen the beginnings of beautiful things. The essence of the creative instinct is dissatisfaction with the thing created. Discontent has been rightly held to be Divine; it is the motive force of all great work.

In these days there are many bitten with so-called realism: holding to its shibboleths, they tell us that photography's exactitude gives to it the highest place. They contend that the most unerring hand and the keenest sight must fail to achieve the accuracy of the lens. But, as everyone knows, the lens has its own particular tricks of distortion; hitherto, moreover, it has only given us form. It is now reported, although on somewhat uncertain authority, that M. Lippmann has succeeded in producing a photographic negative in colour. I have never doubted that photography in colour would ultimately be added to the triumphs of science; and although M. Lippmann's present achievement may be questioned, we may confidently assume that complete success will ultimately crown the efforts of the scientists working to this end. In this connection, however, there is a significant fact which must not be forgotten. The perspective of the lens is different from that of the human eye; therefore movement as seen—registered, perhaps I should say,—by the lens is a caricature on movement as seen by the eye; the nerves of the eye cannot correspond with the brain with the rapidity which permits of motion appearing to be actually arrested, as in the case of an instantaneous photograph. The learned professor of physics, to whom we are indebted for the last discovery in photography, has, it would appear, succeeded almost too well in his researches; for in photographing the solar spectrum, he not only finds on his coloured plates all the colours of the rainbow, but the infra-red and ultra-violet *invisible to our eyes*. This is a most significant fact when taken with those other facts. If we want pictures which will give us transcripts of nature as seen by an abstraction—a cold, impartial, insentient automaton, minus head, minus heart, photography will give us our desire.

But human beings want human pictures: it is the great soul of man blended with the great soul of nature which we see in an inspired picture. It is not nature, nor is the photograph nature—it is merely an illusion; in either case it is a conventional rendering of nature. But surely it is unnecessary to point out that a beautiful scene, of which the impression has gone through the crucible of man's brain, merging itself into half-forgotten memories of other scenes, and with those figments of the fancy—the scenes which might have been seen, but never have been seen,—those lights that never were on sea or land,—such a picture, in fact, which dates its being from the interweaving of all these realities, seemings, and abstractions, is the only artistic offering meet for our plaudits.

The egoist may say, "Give me the photographic transcript; with that before me, I can supply the rest for myself. I can paint my own picture mentally." If you answer him, "Why not go direct to Nature?" he may reply, "It is not convenient." This line of argument is only to be met in one way; but that, to the man of artistic instincts, is a conclusive one, since it is built on the rock of common human sympathies. The first and the most important use of a work of art, is to the artist himself. In painting it, and in the completed work, he has found relief for his own unrest and an outlet for his own upstriving. Its second use is personal too, for it lies in the fact that the artist feels sure that here and there, standing far apart perhaps, there are men and women who will find in it the window through which they may peer into his soul, and that, though their voices are inarticulate, their warmest thanks and feelings of sympathy are going out to him. He has his reward, and he showers benefits on others; if the work is really great, on countless others to be born.

But, although no photograph can be a work of art, neither can any mere naturalistic transcript or scientific impression. The painter who comes to Nature with design to emulate the achievements of the lens, to register its conclusions in fact, comes in a spirit so hopelessly at variance with the true artistic spirit, that the production of great work is out of the question. So with the impressionist of the scientific school—he who, having pitched upon an arbitrary centre, refuses to paint more of the environment of that centre than could be seen at one glance, and without moving the eye: he forgets that the very essence of the matter with the artist is, to see just what he likes, and not to see that for which he has no correspondence. The seeing or not seeing cannot be reduced to a scientific certainty; the attempt ends in the very opposite result from that which was desired. In order to know what *can* be seen and what *cannot* be seen, a constant return to the object would be necessary ; and, even then, no two onlookers, not even after a year's study, would see alike, much less be able to interpret alike what they saw. The nerves of the eye are never alike in any two persons. Some one has said, "The Lord never made two leaves alike, nor two people alike," and it is equally certain no two persons whose eyes are directed to one object see that object alike. To say nothing of physical differences in the eye itself, which give a different appearance to colour and to form in the case of any two persons whose vision is directed to the same object, the past history of each individual, in a personal and in an hereditary sense, determine what he shall see and what he shall not see. We walk side by side through life, but we see utterly different objects. Temperament makes pictures: this is the essence of the matter.

Photography's service to art, therefore, can never be more than subaltern service ; nevertheless its services are manifold and all-important. The lens cannot give us an individual view of Nature, but it can educate us to see a hundred and one things which would otherwise escape us. It can show us minute beauties in any given space, upon which, once having seen, we shall in future never be content to close our eyes, although it does not follow that we should paint all we see,—much may be outside the scope of our picture ; but if we have taken firm hold of a central idea—a beautiful conceit—and we are really strong, knowing every detail of it will neither irritate us, nor, in a permanent sense, confuse us. We shall know very well what to paint, and what to leave unpainted. In his recent admirable work on the Barbizon School of Painters, Mr. D. Croal Thomson, in speaking of certain critics of Corot's paintings, says : "They think, because every leaf on the trees and every blade of grass in the field cannot be observed with distinctness, that they are unfinished, and that this method of work was adopted by the artist because he could not draw well and minutely. Their pictorial sense has been destroyed by the examination of photographs and such things, and they believe honestly that a picture which conveys the feeling of a scene, however true it may be in general, cannot be good as a whole, because of the evident want of detail in all parts of the design. They will not believe this is intentional, and they continually sneer at what they call the shirking of careful finish, the scamping of a lazy or incompetent painter."

This is justly said, but it is also true that if Corot and other painters of Barbizon had had what I may call a little more photographic knowledge of nature, a wider education in fact, their works might have possessed an additional claim to our admiration—deserving of our high admiration as they undoubtedly are. One may see too little in Nature just as one may see too much; the great French painters of 1830 might, without sacrificing anything of breadth, without being any the less great poets, have given us a little more detail in their works; at all events, they might have been accurate in what they gave us had they made use of their opportunities of studying nature minutely.

The practice of employing photography, of examining photographs too closely, until the essence of them has taken the place of the artistic spirit, is fraught with great dangers. Take the case of Meissonier: I am not going to assert that he actually studied photographs in this sense, but that indirectly, if not directly, photographs had their influence upon him, and that that influence was not good I stoutly affirm. Thus his *genre* pictures, as I have said in effect elsewhere, although they recall the Dutch and Flemish Masters, lack the spontaneity of these old fellows whose visual faculties had not been impaired by the contamination of consorting with the cold, heartless lens. Meissonier is Argus-eyed, but his many eyes are all to one focus. They enable him to cover impartially a large surface. If each eye had a temperament behind it, we might get some confusion, but we should not get irritating impartiality of treatment. Meissonier was great, unquestionably, but this over fidelity to detail and "finish" gives a photographic appearance to his work ; he did not look at nature with the seeing-where-it-listeth eye of the true artist ; his was a growing impression, and it grew and grew until his picture became a specimen under the microscope rather than a picture. The result is hard and metallic. Nothing is suggested. Nothing is left for the imagination.

Whatever one may think, however, as to the service or disservice photography has rendered to Art Proper, there can be no question at all that it has proved an invaluable aid in the case of reproductive work. There are many pictures which neither by any form of etching, reproductive or suggestive, nor by any form of engraving can be reproduced so well as by one or the other of the many processes—photogravure, photographic etching, and the various forms of photographing on to zinc through a thin gauze—which have photography at their base. The last process mentioned lends itself admirably to book illustration, especially if the draughtsman will only consent to work with an eye to the exigencies of the process. The result is, of course, more or less mechanical, but book illustration, save in the case of such illustrations as result from that artistic attraction which has drawn an artist to a particular work with desire to give pictorial effect to it, must be mechanical. Artists, however, who respect their work can more safely trust themselves to a mechanical contrivance whose peculiarities they can study and circumvent, than to the tender mercies of another artist, the engraver or etcher, who may it is true improve an indifferent work in reproducing it, but who, in the case of a really great work, is very likely to miss its fine qualities.

To sum up, photography, misnamed an art, is a science. As a means whereby art may learn how to give ampler expression to its own intuitions its value is not easily to be overstated.

JAS. STANLEY LITTLE.

HUSBAND'S PAPYROTINT PROCESS FOR LITHOGRAPHY IN HALF-TONE.

SOME four or five years ago, there was published in the *Journal of the Photographic Society of Great Britain* an account of the process of Lithography in half-tone, called "Papyrotint," which had been recently introduced by Sergeant-Major J. Husband, R.E.

Since that time the process has been in constant use at the School of Military Engineering, Chatham, for the reproduction of half-tone subjects of all kinds for the Government. Many variations of the original formulæ and methods of working have been tried, and it will, perhaps, be of interest to give a short account of the method which has been found by Sergeant-Major Husband to give the best results. The description will, of course, closely follow that which was originally published.

A fairly good paper is floated on a gelatinising bath composed as follows :—

Gelatine (Nelson's flake)	8 oz.
Chloride of sodium (common salt)	2 ,,
Water	50 ,,

The water is measured out first, and the other ingredients added. After soaking in the cold water for some hours the gelatine is dissolved with gentle heat. The solution must not be raised to too high a temperature, or it will become stringy. It is then strained through a piece of muslin.

Bubbles are removed by drawing a strip of paper across the surface of the bath, and the paper is floated on the bath for about two minutes. It is then hung up to dry in a temperature of 60°-70° Fahr. The paper will take about ten hours to dry, and in this state will keep for years.

When required for use, the paper is sensitised by immersing for three minutes in a bath composed as follows :—

Bichromate of potash	1 oz.
Chloride of sodium (common salt)	2 ,,
Ferricyanide of potassium	100 gr.
Chrome alum	15 ,,
Water	30 oz.

The water is measured out separately, and the other ingredients added. The operation of sensitising need not be done in the dark room, as the paper is not sensitive to light while wet.

The effect of the bichromate is of course to form a compound with the gelatine, which is sensitive to light. The common salt gives a grain to the surface by crystallising out when the paper dries, and thus enables half-tones to be produced. The ferricyanide and the chrome alum harden the gelatine, and enable it to take the ink properly when rolled in. If these salts are not used the surface becomes slimy and will not give a satisfactory transfer.

The paper after sensitising is dried at a temperature of 70°-80° Fahr. in a dark room, and is then ready for use. In this condition it will keep for two or three weeks if preserved in a tin case. It is in the best condition for use about four to six days after it has been sensitized.

The transfer is printed in an ordinary printing frame, preferably in direct sunlight. For a negative of medium density in bright light an exposure of about three minutes is required. When fully printed, the image appears of a dark fawn colour on a yellow background. The paper is then immersed in cold water for about three minutes, so that the gelatine may become as far as possible saturated with water. If the transfer has been over-printed, it should be left a longer time in the water, and if underprinted, a shorter time. The excess of the soluble salts is thus removed. The gelatine takes up the full quantity of water where the light has not acted, and in the other parts a smaller quantity in proportion to the intensity of the light. The image can then be seen in the gelatine in intaglio. The transfer is then removed from the water, and placed on a flat piece of zinc, glass, or stone. The surplus water is removed with blotting-paper.

A hard transfer ink is now used composed of—

White virgin wax	½ oz.
Stearine	½ ,,
Common resin	½ ,,

These are melted together in a crucible, and to them are added 4 oz. of chalk printing ink. The mixture is reduced to the consistency of cream with spirits of turpentine. A soft sponge saturated with this mixture is rubbed gently over the surface of the transfer. An ordinary letter-press roller charged with the same ink is then used to spread the ink evenly. The rolling is continued while the turpentine dries, and the ink is, by this means, almost entirely removed from the high lights, while the deep shadows remain fully charged. Intermediate tones retain varying quantities of ink proportional to the transparency of the different portions of the negative. During this process it is advisable not to hasten the evaporation of the turpentine (as is sometimes done in photo-mechanical work), since this has a tendency to cause the ink to tear away in patches. This part of the process is the one which it is most difficult to learn. When properly carried out it gives a grained transfer in greasy ink, representing accurately the details of the negative.

The transfer is then immersed for three minutes in a bath of dilute nitric acid (about 1 in 80). The excess of acid is removed with blotting-paper, and the transfer is hung up to dry. At this point it acquires a light blue colour, the exact reason for which does not seem clear. This treatment renders the after processes easier, in that the trace of acid left in the paper etches the stone or zinc plate to a slight extent, and renders the work less likely to clog. This slight modification has only recently been introduced by Sergeant-Major Husband, and he finds it a decided improvement.

The transfer is then damped with water, by passing a wet sponge over the back of it two or three times. The surplus moisture is removed with blotting-paper. It is pulled through the press on a polished stone or zinc plate, which has been held in front of the fire to expel any moisture which it may contain. The stone or plate should be allowed to cool again before the transfer takes place, to diminish the tendency which the ink has to spread. The transfer should be pulled through once only, under moderate pressure and using a hard backing. The paper is sure to stretch, and this will cause slight blurring, or a double impression if it is pulled through more than once.

The transfer is then removed without damping, when it will be found that the ink has almost entirely left the paper and adhered to the stone. Gum up the stone, and print in the usual way, but, if possible, let the transfer remain a few hours before rolling up. Do not wash it out with turpentine, as this weakens the image. Use middle varnish to thin down the printing ink.

For preparing transfers with a coarser grain a little more ferricyanide of potassium may be added to the sensitizing bath, or the paper may be dried at a higher temperature. If the paper has already been prepared the grain may be rendered coarser by slightly warming the water in which the transfer is placed after having been printed, or else the paper may be heated a little before being exposed. The last is a somewhat uncertain method, as there is a risk of the paper not being uniformly heated all over. The fine grain is more suitable when a considerable amount of detail has to be shown. The coarse grain is preferable for bolder subjects.

With ordinary care some thousands of copies can be obtained from a single transfer without deterioration.

It will be seen that the process is very cheap, and it only requires practice to obtain satisfactory results. The materials for a 15″ × 12″ transfer cost about a penny or twopence. The operation of preparing the paper takes about an hour, and that of transferring and preparing the stone for printing another hour. Of course no allowance is here made for the time occupied in drying the paper or printing the transfer.

A. M. MANTELL.

MEMORY AND IMAGINATION.

WILLIAM OF WYKEHAM had a quaint and wholesome motto to the effect that "manners makyth man," but apparently he never went to the length of saying what makes the manners; neither has anyone else since his day either in Winchester or elsewhere. Are, for instance, the different manners or dispositions which lead one set of members of a photographic society to talk, another to work, and a third to neither talk nor work; are these and other idiosyncrasies due more to training and extraneous influences, than to inheritance and predisposition? At first this appears an inquiry better fitted for some philosophical journal than for the pages of the PHOTOGRAPHIC QUARTERLY. Yet, on second thoughts, especially when one calls to mind a recent remarkable public penance, remarkable for its being such a grotesquely pugnacious penance (if such can be imagined), on second thoughts to ask if character is born at the beginning of a child's existence in the shape of a germ, or is bred, say, in a house-boat, would not be such a *very* impertinent question after all. Manners are often the revelations of character, and those revelations may be made even through the agency of the photographic press. Picture to yourself, in particular, that repentant one, so recently going to his father confessor, so to speak, with the doleful cry,—

"Father, father, I have come to confess. I have deceived many men, and led them astray with false teaching!"

Now the properly consistent thing for this child of grace to say next would surely be,

"I would earn their pardon, as, O Father, I ask yours."

That is what any ordinary penitent would say; but, then, this is evidently *not* an ordinary one. For he turns his back upon his confessor, and straightly denounces his victims as "idiots," and one especially is stigmatised as a "worm," whose speech is "drivel," and whose writing is "trash"!

Where now are the ashes? Does the sackcloth fit the figure of that rampant penitent? Why! the ashes are the sport of the breezes that blow about Charing-cross Road, and the sackcloth has been cast aside as interfering with the movements of that whilom inspired one, who stands now with arms bared crying, "Let me but look upon mine enemy, and he shall die the death!"

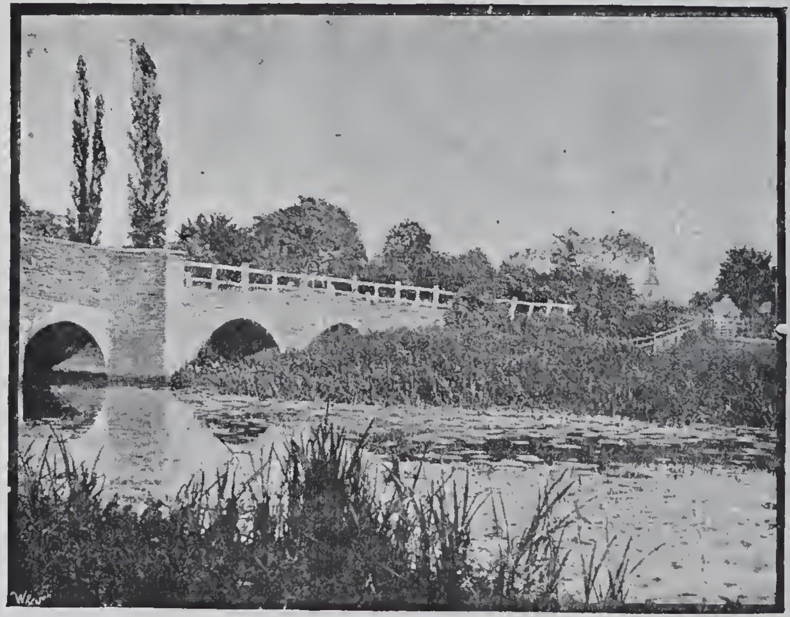
Yes, it must be confessed that though this courts the inquiry more of the philosopher than of the photographer, it seems not altogether irrelevant to ask, not only if manners are made by character, but also if we may not use our knowledge of that character as a touchstone for testing the value of a man's artistic teaching, in cases where the knowledge is forced upon the world at large.

It just flashes across one's mind;—can one whose idea of resenting, what he conceives to be an injury, consists in the vilest abuse, the lowest, unworthiest and most despicable sneers at the want of opportunities which his adversary (no shame to him) possesses for indulging in the pursuit of Art; can one with such a disposition be capable of winning his way into the confidences of that gracious Nature and that refining Art, which we believe to be so full of dignity and sweetness? Nature is gracious, and so is the true naturalist. Art is refined, and so should the artist be. If he were not by predisposition, then the proper influences would make him—for the influence of surroundings moulds the human mind or character, for good or evil, to an enormous extent. Were a child—born with brains—allowed to grow up within four blank walls lighted from an inaccessible window, and supplied with food through an aperture, without sight or sound of mankind, the probability would be the production of a creature without a mind or character at all. Although such an experiment has never been tried, yet many a mind is being starved and forced to feed upon itself, and many a character is being warped and distorted, through the want of another congenial and stimulating mind in the one case, and by daily contact with what is utterly out of harmony with it in the other. A man must oftentimes be saved from his own thoughts, which, like fire, are sometimes comforting servants, but at others most appallingly tyrannical demons. Give him an interest for his mind to feed on, supply him with stimulating influences, and the result will be a healthy one. But give him the interest only, and then there will be a struggle between the thoughts suggested by his pursuit and those thrust upon him by his surroundings. Happy is the man who is callous. Lucky is he whose thoughts are sufficient unto himself. Thrice blessed are those men or women who can shut out the real that would damn them an' it could, and surround the mind with an atmosphere of delightful thoughts and can place it at will in the tender keeping of Memory and Imagination. Memory comes back from her noiseless journey, which knows not space of time nor distance. A swift traveller is she and a skilful musician: for who so sweetly plays upon old associations? But sometimes, too, she feels gently for and touches with slightly lingering fingers those great hidden chords whose notes are sighs. She whispers of love and sings of summer-time. The breath from her lips is on your cheek like the breeze she has inhaled in her flight across the ocean. Her face is an everchanging picture; sometimes her eyes are the colour of the forget-me-not, at others the soft velvety violet of the heart's-ease. Now serious with the grandeur of a mountain pass, another time laughing like a bubbling brook, and always beautiful. She tells divers stories, and when, as sometimes is her custom and her fault, she leaves a gap in her tale, then in steps Imagination to fashion a fancy wherewith to patch it up. But with all her faults, Memory is more dear than that capricious Imagination with her fickleness and uncertainty. The wings of Imagination are longer and stronger and her flights higher may be. But although her face is beautiful and might be grand, yet it is what we make it; thus the dread exists that some time when the Dark Spirit has come up from the black depths, even from below Hades, to try to drag the heart back and down with her, we may look in the face of Imagination and find it loathsome.

There are, at any rate, some occasions when we feel disposed to look leniently upon the deceitfulness of Imagination, and they are when, in the guise of Anticipation, she presents us with highly coloured pictures of the "going to be." What matters it, though we know the rosy hues to be unnatural? What recks it, though sober experience, perhaps bitter experience, has taught us time after time that these highly-coloured pictures are *not*, and never will be, advance copies truly drawn of anything in Realisation? Believe in Anticipation, notwithstanding her failure to keep faith. Forget those disappointments. Is it not better to be, with De Quincey, the child of our Lady of Sighs, than to be "cursed with the burning curse" of our Lady of Darkness? And when a man can no longer surrender his mind unreservedly to the blandishments of Anticipation, when he can no longer discern from the top of Mount Nebo his promised land, then know,—that maybe our Lady of Sighs will be ready soon to leave him to her sister of Darkness.

Memory and Imagination must be always whispering in the ears of the painter. Sometimes Imagination alone drifts into his brain, like the smoke from the bottle in the "Arabian Nights," growing and growing until it fills it with the wonderful shape of a genius. The landscape artist, painting his big picture from the sketch he made some weeks, perhaps months, before, knows how much he owes to Memory, who so often holds his fingers round the handle of his brush, and goes with him over the canvas, like a mother teaching her child to write. But how about the photographer? Are Memory and Imagination prepared to help *him*? Do they not rather turn their backs upon him, and refuse to have dealings with him, so far as the practice of Art is concerned? I don't think they do. These two, like all damsels, like to be sought after and courted, and the photographer makes himself, as a rule, so perfectly independent of them and their aid, that it is no wonder their influence is so seldom seen in his work. It is to be hoped this state of things will not last. There is no reason why a photographic artist should any longer think it illegitimate to produce a finished picture in which the whole of the effects have not been produced by methods photographic. The finest picture (in my opinion) in the last Pall Mall Exhibition was one where the brush had been extensively used with most excellent effect, and it is through brush and pencil mainly that Memory and Imagination will help the photographer. But in the case of the picture referred to, and in others where a similar supplementary aid had been sought, there was a great outcry, and what was apparently thought a most damning accusation was made in four words, "This is not photography!" One can sympathise with a protest against worked-up photographs being pitted against those perfectly innocent of either crayon or Chinese white; but to discourage the use of such aid when a man can, by doing so, produce something more beautiful, or to taboo anything not photographic, seems irrational and illiberal. Do we want to make a man a photographer or an artist? For that is what it comes to. If the first,—very well, then, prohibit the sale of pencils and brushes to all amateurs and professionals. Fine and imprison every man whose pictures exhibit the slightest brush-mark. Let every picture, before being accepted by the Hanging Committee, be well washed in soap and warm water. In the schools and text-books teach the aspirant the new commandment, "Thou shalt not paint upon thy prints."

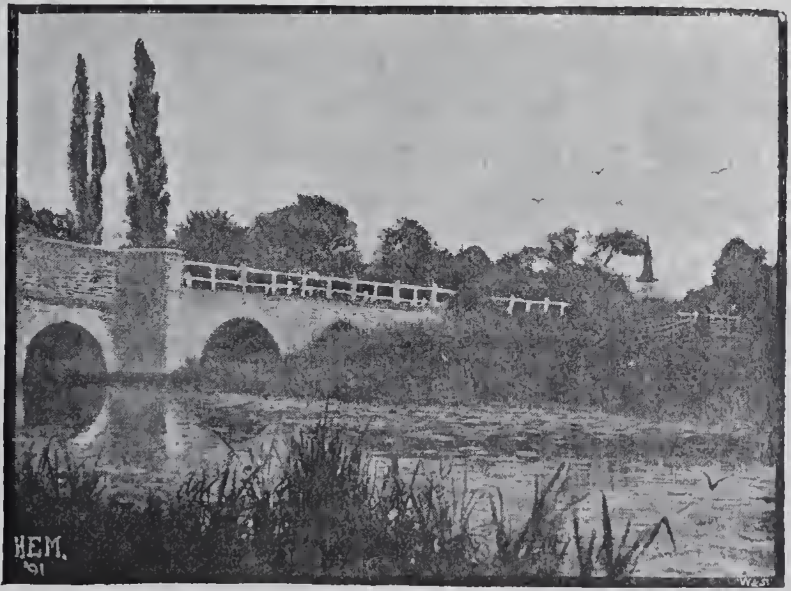
But there may be one or two who wish to encourage such a thing as Art in conjunction with photography. We will not go into the vexed question as to whether photography *is* an art in itself, but, for the sake of peace and quietness, speak of photography *in conjunction with* Art. Well, these earnest workers are using photographic methods in a more or less artistic way. But why should they confine themselves to these chemical ways, when there are others? Of course, if they wish to be photographers, they won't touch a brush; but if they aim at being artists, they will not hesitate to supply what Memory and Imagination suggest will improve their photograph into a picture. It must be admitted that reluctance to do this is natural, because the matter is not upon a proper footing. Photographs worked on should not be brought in a kind of shamefaced way to compete with ordinary ones. The result is cavil, and a minute investigation for a trace of brush-marks; and, if found,—denunciation. Such "photo-pictures" should be distinctly recognised, and as a class by themselves. Then, so far from their authors—like fakers of dog's ears—being reticent as to their methods, they would be the open exponents of a legitimate art.



PURE PHOTOGRAPHY.

Here, for instance, is a reproduction of an Aristotype print from a negative taken in a very pretty district of Surrey, in the early afternoon. You expose a plate when you see it, perhaps, and pass on in search of fresh material. But go to the same spot some hours later, just after the sun has set, and you feel you must linger now, under the spell that is always woven in such places by the evening, so calm and soothing. The gentle current of the stream is kind to the water-lilies that float upon its surface, and does not with any boldness or roughness in its manner of flowing tear their sinuous stalks from the bed in which it has suffered them so long to grow, that they have waxed strong and grown beautiful in consequence. So lusty are the leaves, they might almost bear the weight, would he but try, of that screaming swallow who has left his brothers and sisters in their swift and happy flight amongst the insects up above, to dip his panting breast in that small space of clear water which the lilies have not yet overgrown. It is an old saying that—

> "When swallows fly high
> Fine weather is nigh;
> But when they come low,
> Bad weather will blow."



PHOTOGRAPHY AIDED BY THE BRUSH.

It would be difficult to say this evening what manner of day the morrow will be, as they are neither high nor low, but just high enough to sometimes bring their black flitting bodies against the wealthy golden west, and to please the artist by the moving contrast. But when they fly lower—and they need descend but little—they are lost against the duskiness of the opposite bank, with its coast of reeds and rushes, topped by a spire, and the serrated edge of misty purple trees, standing out against the graduated brightness of the sky, into whose darker regions two poplars lift their aspiring lankiness, as a kind of set-off to the low-arched, stretched-out brick bridge, providing with its white railings the nearest way to church. The sleepy sound of lazily rung bells comes down through a gap in the trees; it almost seems to ooze through the still warm air. Shall we go up across the bridge to church? For we cannot take a photograph now.

Afterwards, at home, there is an attempt to suggest in black and white some such effect as was observed that evening. Surely such attempts need not be discouraged; at any rate, until photography has gained the power of recording *all* we saw. No one need be discouraged by the critic who says that this kind of thing is not photography. Supposing it is not, what then? Is it something mechanical that has been manufactured? or an underhand dodge that has been effected? If the least attempt has been made to apply the methods of the painter to the photograph, then it is less mechanical than photography. If no attempt has been made to disguise the means, there is no "sneaking," and no apologies are necessary to any one.

It is undeniable that the finest things seen in Nature are not photographable at all. There is a certain ancient tree on a bank in a lane, high up on one of the Surrey hills. It flings out its gnarled and leafless limbs right against the great background of an atmospheric portion of the Weald country, some of whose villages and spires make blotches and dots of a darker shade than that of the prevailing haze. The dry red sand is by degrees sifting out from the roots of that tree, leaving them like reversed copies of the overhanging branches, and trickling into the deep dusty lane, which quickly descends and is lost amid the fragrant pines that frame a narrow piece of the same distance. The sky is blue overhead, but up from the west is coming an angry array of clouds charged with electricity. Decay and undermining already at the roots; perhaps, before the night is old, one blast of lightning will shatter to pieces that ancient monarch. Thanks be to Memory and Imagination for that picture!

* * * * *

They call up another of a tall church tower upon a little hill. There is a weather-worn pinnacle at each corner of the tower; but you can yet trace the grotesque features of mediæval monsters upon the rotting stone. Whitewashed, red-tiled cottages cluster below the church down to the meadow, whose hedge-bank forms an ideal foreground of tangled growth, through which timidly push the petals of the primrose; that lovely, lurking, pale outpost and advance guard of the army of flowers soon to come with the warmth of the spring. And it must be coming soon; the west wind whispers so, as it shakes loose the almond blossoms. It is written on the face of the dappled sky, and is sung aloud by the nesting birds. So sayeth Imagination.

* * * * *

Look now, while Memory shows us a tide flowing, or gliding rather, over the glistening sands, washed by boisterous little waves, some of which (as one so often sees them) run back to meet their advancing brothers and dance for a moment in their arms till finally they disappear. Inland the heat is palpitating over the sand-hills, while right across the blue waters of the bay stretches out a mountainous but gradually dwindling coast-line. There is nothing to break the rhythmical sound of the waters; long rows one behind the other of little white waves, falling and pushing, bubbling and curdling along towards the beach, and all the time a gentle gliding sound as the water creeps higher and higher. There is not a sign of life,—not even a seagull to break with its white wings the intense azure of the sky,—unless that be a sail over there creeping out of the harbour in the corner of the bay.

* * * * *

Let, then, Memory and Imagination do something for the artist who photographs, even as they have always been ready to do, to a much greater extent, of course, for the artist who paints. There are many photographers with great taste, keen and very sympathetic appreciation of what is lovely and sublime, and with some knowledge of the use of painter's tools. They may not know enough to be able to paint a picture right away, but they certainly could, if they only would, more often add to the charm and real artistic value of their photographs. Many photographs can be produced of the same spot one like the other; but let a man spend a little time putting a touch in here, or stumping over something there, with the definite idea of producing some particular effect, then he will not care to go on doing the same to a dozen prints, losing value in multiplicity. The one to which he devotes his time will be the outcome of too much care for him to wish to make it common. In fact, it will either convey the most pleasing impression he ever gained of his subject borne in upon his mind by Memory, or it will exhibit the best he can make of his conception of what it ought to be according to his Imagination.

H. ERNEST MURCHISON.

THE RELATION BETWEEN ABSORPTION AND SENSITIVENESS OF SENSITISED PLATES.

IN an article which appeared in *Eder's Jahrbuch*, 1890, upon "Luminescence and Chemical Action of Light," Professor E. Wiedemann has given us a theory with reference to the vibrations of molecules, their amplitudes, and the decomposition actions therewith connected, in somewhat the following words:—

"The appearance of luminescence is a sign that within a molecule very energetic vibratory movements are present. Such increased vibratory movements must evidently occur in all cases where an absorption of an incident light ray takes place, if the absorption depends upon the enlarging of the amplitude of the vibrations in the molecule at the cost of the incident ray, which in those vibrations within the molecule becomes existing energy, which may be converted either into radiatory or into heat vibrations. We can conceive both of these occurrences as a kind of damping. By fluorescence the first factor plays a great *rôle*, by absorption without light development the second. If a body is decomposable by incident light, a decomposition occurs if, in consequence of the absorption, the amplitude of vibration in the molecule has attained a certain magnitude. If, however, the amplitude remains under a certain greatness, no decomposition can practically take place. The value of the amplitude depends, however, upon the absorption-coefficient's greatness, and, secondly, upon the damping. If the absorption is *nil*, then the value of the amplitude is *nil*, and likewise chemical action. If, on the other hand, the damping is very great, then the conversion of motion within the molecule takes place very rapidly, and, in spite of strong absorption, no decomposition shows itself. Now this damping is apparently the greatest for the places of strongest absorption ; therefore, if we sensitise a plate with some suitable substance for the incident rays which to this maximum correspond, the maximum of sensitiveness may not appear there, but somewhere else more or less adjacent to it."

Such is, practically, the theory laid down ; and in the following pages I shall describe a series of experiments bearing on the relation of spectral sensitiveness to spectral absorption of bromide of silver plates sensitised with various dye-stuffs.

I will first of all give a short historical sketch of what has been said and done by earlier workers in this direction ; but, I would at once remark, that hitherto the absorption of the silver bromide plate itself, sensitised for the different parts of the spectrum, has not been investigated, but either that of the coloured gelatine plate without silver bromide addition, or that of solutions of dye-stuffs.

Dr. Vogel has shown that sensitiveness occurs in those parts of the spectrum where there is absorption—a fact which is naturally right. However, he went further, and affirmed that sensitiveness- and absorption-maxima agree.

Captain Abney maintains that sensitiveness and absorption agree throughout in their spectral position.

Mr. C. H. Bothamley, in a lecture given before the Society of Chemical Industry, January 30th, 1887, states :—" When the absorption-spectra (of gelatine films stained with dyes) thus observed are compared with the sensitising action of the particular dyes, it is found that in every case the absorption band and the band of sensitising effect correspond, but do not coincide : the point of sensitising effect is nearer the red end of the spectrum than the point of maximum absorption. This is due to the association of the dye with the dense particles of silver bromide, the band being displaced towards the less refrangible end, in accordance with Kundt's law. . . . When, however, the absorption-spectrum of the dyed gelatine bromide itself is examined, it is found that the absorption band and the sensitising effect are absolutely coincident, a result which affords confirmation of the fact first proved by Draper, and firmly established by Vogel and others, that in order that light rays may produce any effect on a substance they must be absorbed by that substance."

Some experiments of J. B. Messerschmidt, who estimated the absorption-coefficient of a series of dye-stuffs which were dissolved in a variety of media, arrived at the conclusion that the absorption bands of the dye-stuff have no fixed position in the spectrum, but that this is influenced considerably by the surrounding medium. With the increase of the density of the solvent the displacement of the absorption bands towards the red also increases. The positions of absorption- and sensitiveness- maxima estimated by him do not agree. He believed, however, that we can imagine a solvent so dense that the displacement of the absorption bands becomes so great that they will agree with the position of sensitising action. He believed that this would be the case with the dense silver bromide.

Dr. Eder, in his new work, "Photographie mit Bromsilber Gelatine," says pretty much the same thing concerning the displacement of sensitising action with reference to the absorption of the dye-stuff itself. "Therefore it is proved that the maximum of sensitiveness of dyed gelatino-bromide of silver plates is not identical with the maximum of absorption of the dyed gelatine, but that we must take into consideration the dyeing of the bromide of silver itself. That the silver bromide is, as a matter of fact, dyed, I have experimentally observed. For the explanation of the great displacement of the maximum of light absorption with reference to that of the photographic sensitising effect of silver bromide can Kundt's law be quoted, according to which, in most cases, with the increase of the refracting power of the medium the absorption bands of the included dye-stuffs are displaced towards the red end."

APPARATUS AND METHODS EMPLOYED.—For the examination of spectral absorption and sensitiveness I used a spectroscope which was constructed for me after the model of the Kirchhoff-Bunsen spectroscope. The prism was of flint glass, the refracting surface of which was 60 sq. mm. The collimator and telescope lenses were 41 mm. in diameter, and a focus of 32·5 cm. The telescope, collimator, and a millimeter scale were each independently capable of being turned around vertical axes; the whole apparatus being constructed in the most solid manner possible.

Plate-holder.—Near the eye-piece is a frame, with side opening constructed in the telescope tube, in which a plate-holder of the following construction could be inserted:—It consists (fig. 1, perspective view; fig. 2, section) of a brass frame A, A, A; B, is a rectangular opening in the frame, 27 by 39 mm.; C, is a narrow ledge, upon which the light sensitive plate rests; D, is a shutter which slides in and out along the back wall of the frame; E, is another shutter at the front side of the plate-holder, which likewise runs in a metallic groove. If both shutters are inserted the frame is light-tight. In order to keep the plate as firmly as possible in position there is placed between the back part of the plate and the shutter, D, a spring made out of watch-spring, and suitably bent (see fig. 4). In order to bring the frame always at the same position in the apparatus it is provided with a small hole (F). To this corresponds a similar small hole in the above-mentioned frame of the spectral apparatus near the eye-piece, and through both holes a metal pin is inserted previous to exposure.

When an absorption had to be made a specially sensitised plate was inserted in the plate-holder. Before the slit a plate was placed, the absorption of which was to be determined; in fact, either that of the dyed gelatine film or silver bromide plate sensitised with some dye-stuff. The plate, which was usually about 27 mm. wide and of different lengths, was inserted in a frame (fig. 3) of the following construction:—A, is the base of a thick wooden block; B, B, B, show the top and sides of a channel through which the absorbing plate was pushed; C C, is the channel, about 1·5 mm. wide, really somewhat wider than the thickness of a thick glass plate; D, is an opening about 3 mm. wide and 20 mm. high; through this opening the light falls upon the absorbing plate, and passes through it before arriving at the slit. In my apparatus

C to D is about 30 cm. During an experiment the plate was pushed by the hand between short intervals, so that fresh parts were constantly brought before the slit. If a plate happened to be quickly discoloured by light it was in that case more frequently moved.

For estimating sensitiveness-maxima the plates were cut up to size exactly the dimensions of the plate-holder. The millimeter scale was always photographed, whether for photographs of absorption- or sensitiveness-maxima; and generally both exposures were made at the same time. In order to have the upper part of the plate free for the photograph of the scale, the under half of the slit was covered. Of course, in every case a trial exposure was necessary to determine the correct exposure to give.

THE LIGHT SOURCE.—In order to work always as nearly as possible under the same conditions, I have in the following experiments, with one or two exceptions, only used one kind of light source, namely, a Welsbach incandescent gas-burner. In some cases I gave exposures of seconds only; in other cases I had to give exposures varying from five to ten, or even twenty, hours or more, according to the sensitiveness of the plate employed. The millimeter scale was always illuminated by an ordinary fish-tail gas-burner.

THE ESTIMATION OF THE WAVE-LENGTH WITH REFERENCE TO THE MILLIMETER SCALE.—In order to estimate the wave-lengths which correspond to the different parts of the millimeter scale, and which throughout always remained the same, I naturally photographed the solar spectrum and scale upon the same plate, and from the Fraünhofer lines and agreeing scale numbers I made a curve in the usual way to determine the wave-lengths of the intervals between. The following table gives some of the scale parts with the corresponding wave-lengths:—

32 A – 7604.
35 – 7200.
38 B – 6867.
40 – 6625.
41 C – 6582.
45 – 6225.

50 D – 5892.
55 – 5575.
60 – 5315.
61·5 E – 5267.
65 – 5100.

70 – 4915.
72 F – 4860.
75 – 4770.
80 – 4620.
85 – 4485.

90 – 4360.
92·5 G – 4307.
95 – 4250.
100 – 4200.
111 H – 3968.

The Emulsions.—The emulsions were produced under the following conditions: As each plate had to be examined, both for its absorption as well as for its own spectral sensitiveness, the emulsions had to be as transparent as possible, so as not to absorb too much light; in other words they had to be what is known as "fine grain." Plates, however, coated with such emulsions, are not very sensitive. Eder, in his recent work ("Photographie mit Bromsilber Gelatine," p. 178) refers to the difficulty to be encountered in following up such experiments. "Dye-stuff solutions give quite different absorption-spectra from that of the dry dye-stuff. It were best to employ coloured silver bromide films; these, however, are prepared with difficulty, so coloured gelatine films had to be sufficient." The colour addition had to be made in a suitable quantity to produce a sufficiently visible absorption. This had also the effect of considerably lowering general sensitiveness, especially with many of the anilin colours, where an addition of ammonia could not be added to raise general sensitiveness. In some cases it required many experiments before good results were obtained. The amount of dye-stuff in proportion to that of silver bromide present varied considerably, and ranged from 0·1 to 25 per cent. by weight. In most cases the plates used for absorption were thinner-coated with emulsion than those which were used for photographing their own spectral sensitiveness.

In order to photograph absorption-spectra, a plate had to be produced sensitive without interruption from ultra-violet to extreme visible red, without showing either maxima or minima of sensitiveness. I experimented to this end with various dye-stuffs and organic bodies, containing different dye-stuffs, but without result. Success, however, at length attended my efforts, through using Jaborandi Tincture. This tincture contains, besides alkaloid, a considerable proportion of a greenish-yellow dye-stuff (probably some chlorophyll). The tincture can be added either before or after the production of the emulsion. The presence of ammonia, as well as the least possible excess of silver nitrate, is necessary for the purpose of increasing sensitiveness. It is not, however, always easy to obtain good results alike; out of nine or ten emulsions I made, only about three were fit for use: such uncertainty, when one forsakes a beaten path, is only too well known in emulsion-making. A plate, coated with the above sensitised emulsion, should show, from about F towards the refrangible end of the spectrum, a sensitiveness curve like that of ordinary silver bromide plates; from F to B the sensitiveness decreases to about one-third, and remains practically uniform throughout the whole district, showing, when properly made, neither maximum nor minimum. In some cases a weak maximum may occur at C, which in other cases is scarcely to be observed. These plates are, however, very slow—about one hundred times slower than ordinary plates of commerce.

DRAWINGS.—These were made from the negatives, and are shewn in the table. The curves E_1, E_2, E_3, correspond always for sensitiveness; a, the absorption of simple dyed gelatine film, a_1, a_2, a_3, to the absorption of the dyed silver bromide film; a_1 and E_1, a_2 and E_2, etc., each refer to the same emulsion. The small numbers indicate the number of experiment in note-book, and are referred to in the text. I might here state that this work has just been published in Wiedemann's "Annalen der Physik." The table of drawings was prepared for the German publication, and consequently the names of dyes and one or two other details are written in that language. The difference between the English and German names appears so slight that I do not think I need do more than allude to the fact.

Observations—Silver Bromide Emulsion.—The determination of the spectral absorption of silver bromide was, through several causes, surrounded with difficulties. These were threefold: (1) The maximum of sensitiveness of AgBr stretches over a pretty wide spectral district, and is nowhere very strongly defined. (2) There is absorption over the whole district to which it is light-sensitive. (3) The want of a suitable plate on which to photograph its spectral absorption.

The difficulties 1 and 2 must necessarily remain. To overcome No. 3 I have photographed a series of absorption-spectra of AgBr (the drawing to the right on the table) upon plates of somewhat different spectral sensitiveness, *i.e.* (α) upon the AgBr plate itself, (β) upon AgBr, AgCl plate, and (γ) upon an AgI, AgBr, AgCl plate under the following conditions :—

1. The optical parts of the spetroscope of glass, and the light a Welsbach gas-burner. Drawing No. 1 shows curves obtained. A, is curve of absorption ; E, is curve of sensitiveness.

2. The optical parts of the spectroscope of glass—the light-source being sunlight reflected from a heliostat. The curves obtained here are practically similar to No. 1, and in both cases the sensitiveness-maximum, in comparison with the absorption-maximum, appears to be displaced towards the red end.

3. The optical parts of quartz, the light-source being glowing zirconia. In this case, in estimating sensitiveness, I placed between the light-source and slit a double film of gelatine and celluloid. For estimating absorption, in order to avoid the use of glass entirely, I used a film of gelatino-bromide of silver, prepared as follows : A glass plate was first of all coated with a suitable solution of celluloid, and when dry coated with silver bromide emulsion. After this was dry (in dark room) it was stripped off the glass. By this means the only difference in the quality of the light-source during determination of sensitiveness and absorption lay in the presence of AgBr. By the examination of a series of negatives upon different plates and by different exposures I received results which are similar to those obtained under conditions of 1 and 2. Although it is difficult to make out exactly where the absorption-maximum really lies, yet I believe to be able to conclude with certainty that the absorption as a whole, and naturally its maximum, is, in comparison with that of the sensitiveness-maximum, displaced towards the more refrangible part of the spectrum, and similarly to the drawings already referred to. The absorption curves in the results following also point to the same conclusion.

Anilin Dyes.—These colours show very little inclination to combine with silver salts ; they are characterised, as a rule, by causing a very great loss of general sensitiveness. In many cases, in consequence of their slight solubility in water or in water and alcohol, it was impossible to employ a sufficient proportion in order to get the most satisfactory effect.

Alkali Blue, 6B.—This dye dissolved easily in water or alcohol and water, and gave a partial precipitate with silver nitrate. A gelatine film, stained with a small amount of this dye, gives a maximum absorption at D ; with a larger amount the absorption begins at E, rapidly increases to a maximum, and continues to the end of the less refrangible side of the spectrum. Added to a "fine grained" silver bromide emulsion, general sensitiveness is at once reduced. The best proportion of dye to silver bromide is about 2 per cent., and, in order to help general sensitiveness, I added ·05 gram $AgNO_3$ to every 2 grams AgBr present. This dye sensitises from A to C, with a maximum at B. From C sensitiveness decreases to D, after which it again increases and attains its maximum in the blue and beyond.

The absorption of this emulsion, starting from between B and C, reaches a maximum at D, continues until F, when it rapidly decreases to a broad minimum at G, after which it again rises.

Anilin Blue.—Anilin blue is soluble in alcohol, or alcohol and water, and gives no precipitate with silver nitrate. The absorption of a film of gelatine stained with this dye is most intense between C and E, reaching a maximum at about D. The best sensitising results were obtained by using ·03 anilin blue to every 2 grams AgBr present, and ·05 $AgNO_3$ (free) to make the emulsion more sensitive. Sensitiveness begins at C, reaches a maximum at D, after which it gradually decreases until F, when blue sensitiveness begins, and soon reaches a maximum. It is noticeable in the case of this dye that the sensitiveness-maximum (in the red) very closely coincides with its absorption-maximum in gelatine, this being of somewhat unusual occurrence according to the well-accepted theory regarding the displacement of the sensitising action of the dye towards the red end; no other dye that I have experimented with showing so little displacement of spectral sensitising action when compared with its own absorption in gelatine. They would appear almost identical; but further experiments would be required to prove or disprove this. The absorption of this dyed emulsion starts at about B, rises very gradually and reaches a maximum at about F, decreasing again at G, after which it rises as shown in the drawing.

Safranin ($C_{21} H_{22} N_4 HCl$).—This dye is easily soluble in water without showing fluorescence. Soluble in alcohol with yellow fluorescence, but insoluble in ether. It is highly tinctorial, and depresses general sensitiveness greatly, even when used in small quantities. $AgNO_3$ gives a partial precipitate, insoluble in water. In a gelatine film the absorption consists of two bands: the first starts from D$\frac{1}{3}$E, reaches a maximum just before E, thence running down to a small minimum at E$\frac{1}{3}$F, thence to a second maximum at a little before F, after which it runs down to *nil* at F$\frac{1}{2}$G. I found the best amount of this dye to add to every 2 grams of AgBr contained in an emulsion is ·025 gram, besides ·050 gram $AgNO_3$ and ·5 c.cm. ammonia, sp.gr. ·937, to help sensitiveness. This emulsion gave a band of maximum sensitiveness at D, but rather on the more refrangible side, showing however a continuous sensitising action through the green, after which the usual AgBr sensitiveness begins. Eder says in "Photographie mit Bromsilber Gelatine" (p. 68): "Safranin is a good sensitiser for green; its action stretches itself by longer exposure until somewhat beyond D. In my experiments the action in the green rises to no strong maximum, but runs till E, whence the curve of action towards blue quickly rises." Eder gives a curve which, however, does not quite compare with mine.

A remarkable peculiarity, appearing in all my results with safranin sensitised plates, exposed and developed in the usual way, is, that from where the region of spectral sensitiveness ends on the less refrangible side, between C and D, to the end of the exposed spectrum beyond A, there is a district showing not only total want of sensitiveness, but considerable bleaching action throughout; and, although a plate may fog chemically all over, yet in this district it resists the developer, and remains bright and clear to the end. At present I have no solution for this phenomenon.

Although the dye sensitises for one band only, the dyed emulsion shows two absorption bands very similar to the dye itself.

Anilin Red.—For experiments with this dye I used rosaniline chlorhydrate. This dye is easily soluble in water containing a little alcohol. $AgNO_3$ causes slight opalescence, and enriches the colour considerably. In a dyed gelatine film the absorption begins at D, rising to a maximum at D½E, as shown in the drawing. The amount of dye I found to answer the best for sensitising was 1 per cent. to that of the AgBr present. A small amount of ammonia (too small to interfere with spectral sensitising action) was used to help sensitiveness.

This emulsion gave a sensitised band at B, reaching a maximum before C, and again becoming nothing at D⅓E, thence rising again at D E, showing but slight sensitiveness until where the region of blue and violet sensitiveness commences. The absorption of this emulsion begins at about D, quickly reaching a maximum at D⅓E, thence decreasing slightly at D½E, remaining same until F⅓G, whence it again diminishes slightly as shown. In the case of an anilin-red dyed plate the sensitising action is considerably displaced as compared with the absorption of the same.

Chrysanilin ($C_{20}\,H_{17}\,N_5\,H\,NO_3$) dissolves fairly well in a mixture of alcohol and water. The gelatine dyed film shows an absorption commencing at E¼F, attaining a maximum on the more refrangible side of F, thence showing general absorption to the end of the spectrum. The best quantity to add to every 2 grams of AgBr present in an emulsion is ·07 gram about, and a little ammonia. This emulsion gives two bands of sensitiveness, a weak one by C½D, and a strong and wide one at F, and between both a minimum at D. The absorption of this emulsion begins at D, and reaches a maximum at F$\frac{1}{3}$G, after which it gradually becomes less until G, when it again increases.

Aldehyde Green.—With this dye it was difficult to obtain very satisfactory results. It is almost insoluble in water, and not very soluble in alcohol. I employed about ·005 grams of the dye to every 2 grams of AgBr present in the emulsion. This dyed emulsion shows a single band of sensitiveness commencing at C$\frac{1}{3}$D, attaining a maximum at C$\frac{3}{4}$D, thence decreasing quickly and maintaining an even sensitiveness through E and F, when the usual AgBr blue and violet sensitiveness commences. The absorption was, in this case, more generally than locally strong, and I determined it visually—the only case throughout the series I did so. There appears to be a slight maximum at D, as shown in the drawing.

Malachite Green.—This dye is easily soluble in water. In gelatine it shows a maximum of absorption at about the same place as with aldehyde green. The band begins at C, quickly rises to a maximum, thence decreasing until D. The absorption in the blue and beyond is similar. For sensitising the dye can be added both before or after emulsification with equal effect, the proportion I found the best being about ·03 gram of dye to every 2 grams AgBr present. In one case I used ammonia to assist sensitiveness (this in larger quantities bleaches out the colour), in other cases ammonia and $AgNO_3$ for the same purpose, with equal results. These emulsions gave a sensitiveness curve closely agreeing with that given by Eder—namely, a maximum at C, then a gap till E, where sensitiveness increases gradually and attains a maximum at G. The absorption of this emulsion starts from B$\frac{1}{2}$C, increases to a maximum at C$\frac{1}{3}$D, gradually decreases towards D, slightly rises at F, but decreasing to a second small minimum at G, thence rising as usual.

Iodine Green.—This dye dissolves easily in water, and gives no precipitate with $AgNO_3$. In gelatine it shows two absorption bands—one, beginning at B$\frac{1}{2}$C, attaining a maximum at C; the second maximum is at D, with a minimum between. This dye in gelatine shows a curious phenomenon, which is, that with the same plate coated with dyed gelatine, either band may show the greater absorption. Before I discovered this fact I imagined there must have been a mistake somewhere; for, on comparing my negative with the visually examined absorption, I could only find one band in the latter at all distinct, whereas the negative showed two. On trying some other part of the plate I discovered the missing band, and found it even to excel the other in absorptive power. The only suggestion I can make for this is, that if a dye possesses two or more absorption bands, one or more may become weakened or destroyed by the action of heat or light, or both combined, the remaining band or bands resisting these influences more strongly. This action, no doubt, simply means "fading" of the dye. Iodine green gave me much trouble in order to get anything like good results. The dye seems a most sensitive body to deal with; it slows the emulsion very greatly, and sometimes I got absorption bands and sometimes not. One fairly good result I got by adding about ·03 gram of the dye to every 2 grams of AgBr present before emulsification. In other experiments I added as much as 15 per cent. of dye to AgBr present without good results. Some of the most successful were obtained by adding the dye just before coating the plates, with a very small addition of $AgNO_3$, and with or without ammonia. The maximum of sensitising action seems pretty much the same in all cases; the exposures, however, varying considerably—from an hour or two up to several days. Although in gelatine the dye shows two absorption-maxima, the dyed emulsion shows only one maximum of sensitiveness in all cases I have tried. This begins at C$\frac{1}{3}$D, and reaches a maximum at C$\frac{1}{2}$D, decreasing until D, then keeping uniform as far as F$\frac{1}{3}$G, when it again increases, and attains a second maximum at F$\frac{2}{3}$G. As regards absorptions, these were on the whole unsatisfactory. Variations occurred in the intensity of the two bands, the same as in the case of the plain-dyed gelatine film. However, as a rule, the absorption of iodine green sensitised plates may be taken as I have drawn it, the absorption bands varying in intensity, according to the amount of dye present, the positions being practically similar to those of the plain dyed gelatine film. There is, however, in the former, considerable general absorption from E to F, diminishing to a minimum at F$\frac{2}{3}$G, before rising to the greatest maximum at H.

Coupier's Blue.—This dye exerts a sensitising action for all the less refrangible rays from E to the infra red. It is best dissolved in water. A gelatine film stained with this dye showed that absorption commences at *a*; at C it begins to increase, and passes through D as a maximum; decreases at D$\frac{1}{2}$E, and gradually fades away at G. For sensitising gelatino-bromide of silver I found ·010 gram of the dye to every two grams of the AgBr present about the best quantity to employ. If used in larger quantity it slows the emulsion considerably, and strains it also darkly.

Professor Eder states that this dye gives only two bands. I found on close examination that, besides the usual maximum in the blue, it gives five bands in the less refrangible part of the spectrum. The first begins on the less refrangible side of A, attains a maximum between A and *a*. The second maximum occurs at C, the third at C$\frac{1}{2}$D, the fourth at D$\frac{1}{2}$E, and the fifth just before E, each maximum being divided by a minimum. The third or middle of these maxima is the most intense.

As regards the absorption of the gelatino-bromide dyed film, the maxima in the negative are too indistinct to be drawn with certainty. The absorption curve given may be taken as fairly representing what I obtained.

Anilin Safrosin.—I am indebted to the kindness of Professor O. F. Fischer for a pure sample of this dye. I found it easily soluble in water and extremely tinctorial; $AgNO_3$ produces a heavy precipitate soluble in water free from $AgNO_3$. In gelatine the absorption-spectrum will be found to agree very nearly with that of Eosin. It commences at D$\frac{1}{2}$E, reaching a maximum at about D$\frac{3}{4}$E, thence to a minimum at E; again rising to a second small maximum, and afterwards fading away towards F.

Anilin safrosin is characterised by an extreme slowing action upon AgBr emulsions, similar in this respect to safranin. For getting the best sensitising effect I used from $\frac{1}{2}$ to 2 per cent. of dye to the AgBr present, the former quantity being the better.

The sensitiveness-maxima are three in number; the first between A and *a*, the second between B and C; the third and principal starts from C$\frac{1}{2}$D, and reaches a maximum just before D and vanishes away at D$\frac{1}{3}$E. Soon beyond F commences strong blue-violet sensitiveness.

This dye also exhibits the curious phenomenon of bleaching in the red and ultra red during development, very similar to that of safranin. The absorption-spectrum appears to consist of a band at C to C$\frac{1}{4}$D (of this I am not quite certain); a second absorption begins at D$\frac{2}{3}$E, reaching a maximum at D$\frac{3}{4}$E, decreasing and ending at F$\frac{1}{2}$G. At G the principal absorption, corresponding to the absorption of AgBr, appears to begin, and soon reaches a maximum.

Fuchsin ($C_{20}H_{19}N_3HCl$).—This dye is easily soluble in water, or water and alcohol. $AgNO_3$ gives no precipitate. The absorption of a fuchsin dyed gelatine film resembles very much that of anilin red. The maximum lies at D$\frac{1}{3}$E, but shades off more gradually on the more refrangible side than in the case of anilin red. For sensitising I use ·05 to ·10 gram of the dye to every 2 grams AgBr present, and besides ·05 $AgNO_3$, but no ammonia. This emulsion gave a somewhat broad but intense sensitive band at C$\frac{1}{3}$D, running down to nearly nothing before D, and remaining as such until the commencement of blue violet sensitiveness of AgBr. The absorption-maximum is considerably displaced. It runs steeply to a maximum at D$\frac{1}{3}$E; at D$\frac{2}{3}$E it decreases to almost nothing, and remains so until past G, when it rises on account of AgBr absorption.

Rose Magdala (Naphthol red, chlorhydrate of rosenaphthylamine, $C_{30}H_{21}N_3HCl$).—Is insoluble in water, but soluble in water and alcohol. A film of gelatine stained with this dye shows a strong maximum of absorption at D^{2}E, diminishing very considerably at E, and down to almost nothing at F. Added to silver bromide emulsion, rose magdala sensitises powerfully for yellow; at the same time without so materially reducing sensitiveness as is the case when using most of the anilin dyes.

To every 2 grams of AgBr present in the emulsion about ·05 grams is a suitable quantity of dye to add for obtaining good sensitising and absorption effect. Also a small quantity of ammonia is useful for increasing sensitiveness. The sensitising action begins at C$\frac{2}{3}$D, rises to a broad maximum on both sides of D becoming considerably reduced at D$\frac{1}{2}$E, and nothing at F, showing little blue-violet sensitiveness, even with considerably longer exposure.

The absorption of this emulsion commences at D$\frac{1}{3}$E, rises steeply to a maximum at D$\frac{2}{3}$E, decreasing to a minimum at a little before E; rising again on the other side of E, and further beyond showing slight AgBr absorption.

Cyanin ($C_{29}H_{35}N_2I$).—This dye dissolves easily in a mixture of alcohol and water. In gelatine the absorption begins at C$\frac{1}{3}$D, rapidly becoming a maximum, which continues till over D; then to a minimum at D$\frac{1}{4}$E, again rising to a second maximum, less intense than the first, at D$\frac{1}{2}$E, and gradually decreasing to nothing at about E$\frac{1}{2}$F. With regard to sensitising action, I got results not quite identical.

The first (No. 20, see drawings) I obtained by adding cyanin to a finished bromo-iodide emulsion with ammonia, in proportion of ·001 gram of cyanin to every gram of the mixed silver salts. Here the displacement of the sensitising action in relation to the absorptive action of the dye itself is not great. Sensitiveness commences at C, reaches a maximum at C$\frac{1}{2}$D, and a minimum at D, then rising to a second and greater maximum at D$\frac{1}{3}$E, and gradually decreasing to nothing at a little beyond E, after which begins strong blue-violet sensitiveness.

This curve is the nearest I got when comparing my cyanin results with those of Dr. Eder. I did not photograph the absorption of this emulsion, for the reason that its coarse grain rendered it too opaque to light.

Amongst many other experiments, mostly failures on account of fog intervening, I got results with gelatino-bromo-chloride of silver. Here we observe quite unlooked-for results (see curve No. 81). The light sensitive bands become considerably separated. The lesser refrangible band remains practically in the same place; then a wide minimum, extending till D$\frac{1}{3}$E, whence it rises steeply, and becomes a maximum at D$\frac{2}{3}$E, again rapidly decreasing, and becoming nothing at a little beyond E. The more refrangible maximum, which in the case of the bromo-iodide emulsion was the lesser, has now become the chief one; and shows, when compared with its corresponding absorption band, but slight displacement towards the red; and, when compared with the absorption in gelatine alone, it shows slight displacement towards the blue—the only case at present I have come across.

The absorption of this sensitised emulsion begins at C$\frac{1}{2}$D, rises quickly to a maximum at C$\frac{3}{4}$D, and continues the same through D, decreasing to a not very deep minimum at D$\frac{1}{4}$E, rising again to a second maximum at D$\frac{2}{3}$E, after which it again decreases as shown. Most of my experiments were made with AgBr. The one referred to in the drawings (No. 144) was made with ·04 gram cyanin to every 2 grams AgBr present, besides ·045 gram $AgNO_3$ and ·25 c.cm. ammonia, sp. gr. ·937. This again gives a result quite different from the others. The sensitising district is wider (possibly due to using a larger quantity of dye), especially in the red. The less refrangible band begins at B, attains a broad maximum at a little beyond C diminishing to a broad minimum at C$\frac{2}{3}$D; again increasing to a second broad maximum at about D$\frac{1}{2}$E, decreasing rapidly towards E. The absorption of this emulsion, though there is considerable difference as regards light sensitiveness, is very similar to that of bromo-iodide emulsion. In the case of the less refrangible band the absorption, as compared with sensitising action, is displaced considerably towards the more refrangible part of the spectrum; but in the case of the more refrangible band the displacement, if any, is quite trifling.

It requires great care, when sensitising with large quantities of cyanin, to prevent fog occurring. Several interesting facts above cited as regards shifting of sensitiveness-maxima and the reversal of the relative intensity of their maxima require further work to elucidate their cause. I may say, finally, that No. 20 was an ordinary finished bromo-iodide emulsion, to which cyanin and ammonia were added before coating. No. 81 was a "fine grain" bromo-chloride emulsion, to which cyanin was added alone. No. 144 was a "fine grain" bromide emulsion to which cyanin, together with $AgNO_3$ and ammonia, were added.

We next come to results obtained with dyes of the so-called Eosine series.

Fluorescein ($C_{20}H_{12}O_5$).—This dye is fairly soluble in a mixture of alcohol and water, and forms a precipitate only with difficulty with $AgNO_3$. In gelatine the dye shows a considerable absorption throughout the visible spectrum. It appears to commence slightly at *a*. At E it begins to rise considerably, and reaches its great maximum on both sides of F; again decreasing towards the more refrangible end of the spectrum, but with continuous absorption throughout, according to the amount of dye present.

For sensitising AgBr emulsion I used quantities of fluorescein dissolved in alcohol and water varying from ·03 to ·200 gram for every 2 grams AgBr present. Ammonia was added in all cases. The sensitising action with the lesser amount of dye first appears as a small band at just before D, then becoming almost nothing, but afterwards again rising rapidly to its great maximum of sensitising action at D$\frac{1}{5}$E; at E it gradually diminishes until F, becoming nothing at F$\frac{1}{4}$G. Beyond G it shows but little sensitiveness in the more refrangible part of the spectrum. The spectral absorption of this dye begins at D, but continues to be of small amount until slightly beyond E, when it begins to rise rather quickly, and reaches a maximum at F, descending in a minimum at G, when it rises again.

When more dye is added spectral sensitiveness and absorption, and especially the latter, are somewhat altered. With as much as 10 per cent. of the dye to the AgBr the small yellow band remains the same; but the great green band at D$\frac{3}{4}$E becomes steeper on both sides, and beyond E$\frac{1}{3}$F there is but little sensitiveness in the more refrangible part of the spectrum. The absorption of this emulsion is practically the same with regard to its great maximum of absorption as that of the emulsion containing less dye. There appears, however, beyond F a considerable increase of absorption until just before G, thence diminishing slightly, but rising again as shown in the drawing. The displacement of the maximum of sensitising action in relation to its own absorption in the case of this dye is very considerable.

Uranin.—Is easily soluble in water, and gives an orange precipitate with $AgNO_3$, easily soluble. If a film of gelatine be not too intensely dyed the absorption may begin at E, rising at once steeply to a maximum of E$\frac{1}{2}$F, thence descending and becoming almost nothing at F$\frac{1}{2}$G, still showing slight absorption to the end of the more refrangible part of the spectrum. If the film be more intensely coloured the absorption commences at D$\frac{1}{2}$E, rises rapidly to a maximum, which is maintained to the end of the more refrangible part of the spectrum.

For sensitising purposes I have used quantities varying from ·1 to ·3 gram of uranin to every 2 grams of AgBr contained in the emulsion. Curve No. 110 represents the light sensitiveness in which the former amount was used. Its sensitising action somewhat resembles that of fluorescein. It begins at C$\frac{2}{3}$D, reaches a very small maximum just before D, thence to a small minimum at D$\frac{1}{4}$E, after which it rises to the broad maximum at D$\frac{2}{3}$E, remaining as such until past E, thence diminishing rapidly to F, when it becomes almost nothing. Beyond this it shows but faint blue-violet sensitiveness.

The absorption begins at C$\frac{2}{3}$D, rising gradually until E, thence more rapidly to a maximum on both sides of F, again decreasing to a wide minimum at G, after which it rises again.

With a larger amount of uranin (for instance, ·3 gram to every 2 grams AgBr present) spectral sensitiveness is somewhat altered; with a short exposure its light sensitiveness rises abruptly at D$\frac{1}{4}$E to a broad intense maximum, decreasing again from E to a minimum, followed by a second maximum at F, which quickly decreases to nothing between F and G, showing but slight sensitiveness beyond. With longer exposure sensitiveness extends somewhat further on the less refrangible side—nearly as far as C. The absorption maximum of the more strongly dyed emulsion is more pronounced, and more nearly resembles that of the dye-stuff in gelatine.

Eosin (Tetrabromfluorescein, $C_{20}H_6Br_4O_5K_2+6H_2O$).—When a gelatine film is faintly stained with the dye, absorption is found to begin at about D$\frac{1}{2}$E, reaching a maximum at D$\frac{3}{4}$E to E.

From E it rapidly falls to almost nothing, but shows, if the gelatine be suitably stained, another slight maximum just before F.

For sensitising purposes I used 5 per cent. to the AgBr present and with ammonia. With such an emulsion spectral sensitiveness commences at C$\frac{2}{3}$D, rapidly rising to a maximum at D, which continues till D^{1}E, then rapidly descending to almost nothing, and rising again at E$\frac{1}{4}$F to a small wide maximum as far as E$\frac{3}{4}$F, after which it again becomes almost nothing. Beyond, in the blue-violet, sensitiveness is very weak.

The absorption of this dye very nearly resembles that of eosine in gelatine. It consists of two bands, the first and greatest reaches a maximum at D$\frac{2}{3}$; the second just before F.

Erythrosin (Tetraiodfluorescein, $C_{20}H_6I_4O_5K_2$).—Is probably of all the eosine dyes the one which has received the most attention at the hands of physicists, and the one which has been the most experimented upon in regard to its colour-sensitising power with reference to the so-called "orthochromatic" photography. In gelatine the absorption is characterised by an intense band in practically the same position as that of Tetrabromfluorescein; on the more refrangible side, however, the smaller band seems to be wanting, and from E the absorption rapidly descends to E$\frac{1}{3}$F, then fades away at a little beyond F. The silver salt of this dye is insoluble only in water containing $AgNO_3$. I prepared this salt, and, after washing it sufficiently, dissolved it in distilled water and added to it thoroughly purified gelatine. Gelatino-silver erythroside shows a spectral absorption practically identical with that of the potassium salt.

For rendering emulsions colour-sensitive various quantities of the dye, ranging from 5 to 25 per cent. of the AgBr present were employed.

Curve No. 40 represents the sensitiveness of an emulsion containing 5 per cent. of dye to the AgBr employed. Sensitiveness begins at C$\frac{}{3}$D, rises at once to a maximum at D, thence descending to a slight minimum, and again rising to a second maximum at D$\frac{1}{3}$E, descending, however, again at D$\frac{1}{2}$E almost to nothing just before E, after which it again rises to a lesser maximum at E$\frac{2}{3}$F, becoming nothing beyond F, and showing but little sensitiveness in the blue-violet. The principal absorption begins at D$\frac{2}{3}$E, and quickly reaches a maximum. At E it rapidly descends; at a little beyond F it again rises to a second small but wide maximum, decreasing again before G; thence rising again.

Curve No. 103 represents the sensitiveness produced by adding 25 per cent. erythrosin to the AgBr present. The difference here to be noted, in comparison with Curve No. 40, is that the yellow-green sensitiveness has gained considerably, but at the further cost of blue-violet sensitiveness, as is shown in drawing.

The absorption curve, No. 105, shows a close relation to its sensitiveness curve; its displacement, however, is very considerable, this being always the case with erythrosin-dyed emulsions.

Curve No. 121 represents the sensitiveness of an emulsion to which ·1 gram erythrosin and ·6 gram $AgNO_3$ had been added to every 2 grams AgBr present, and no ammonia. This curve is very similar to that of No. 40. The absorption curve, No. 171, also compares with that of No. 58 (absorption of No. 40).

Curve No. 123 represents the sensitiveness of the same erythrosin silver bromide emulsion as that which gave curve No. 121; in this case, however, no free $AgNO_3$ was added, but ·5 c.cm. ammonia, sp. gr. ·937, instead to every 2 grams AgBr present.

There appears but slight difference between the sensitiveness of this emulsion and No. 121, the slight difference appears between E$\frac{1}{3}$F and E$\frac{2}{3}$F, where there is a gap in the curve. The absorption is also very slightly different, as can be seen from drawing.

With an ordinary finished bromo-iodid, eemulsion containing 5 per cent. erythrosin to the AgBr present, I made, in order to determine whether ammonia was essential for obtaining colour-sensitising effect, the following experiments—the emulsion was divided into three parts :—

To (1) nothing further was added.
To (2) ·25 c. cm. ammonia was added to every 2 gram AgBr present.
To (3) ·25 ,, ,, and ·08 gram KBr were added to every 2 gram AgBr present.

I found that there was but little difference as regards qualitative spectral sensitiveness, but only as regards their total relative sensitiveness or rapidity. And considering the rapidity of No. (2) as 1, No. (1) would be equal to one-third, and No. (3) to one-sixth; and the spectrum pictures with these relative exposures would be practically similar.

Rose Bengal (Tetraioddichlorfluorescein, $C_{20}H_4Cl_2I_4O_5Na_2$).—Resembles eosin and fluorescein in its solubility in water. Its silver salt is, however, unlike them in being practically insoluble in water. In gelatine the absorption of the dye begins at D$\frac{1}{6}$E, and rises at once to a broad maximum, descending rapidly again at D$\frac{2}{3}$E to a minimum at D$\frac{5}{6}$E, rising again to a smaller maximum just beyond E, from which it quickly descends to nothing. Its silver salt in gelatine is characterised by a considerable displacement of its absorption towards the less refrangible end of the spectrum—it begins at C$\frac{2}{3}$D and becomes a maximum at D to D$\frac{1}{4}$E. The second maximum occurs just before E.

For sensitising purposes I used from ·02 to ·1 gram of the dye to every 2 grams AgBr taken, using ammonia in all cases, and sufficient free silver to combine with the dye.

Curve No. 104 represents the sensitiveness in which the larger amount of the dye was employed. The chief sensitiveness band commences at about C$\frac{1}{3}$D, rapidly rising to a maximum, followed by a minimum from D to D$\frac{1}{3}$E, again rising to a second small maximum at D$\frac{2}{3}$E, from which it decreases to nothing in the blue-violet. The absorption begins at C$\frac{1}{3}$D, rising at once to a maximum at D, descending to a minimum at D$\frac{2}{3}$E, rising again to a maximum at E, from which it falls to almost nothing at E$\frac{1}{3}$F, beyond which there is but little absorption. The absorption of this emulsion is very strong, but its displacement in relation to sensitiveness is not very great, but considerable if we compare it with the absorption of the plain dyed gelatine film.

Curves 113 (short or longer exposures) show the sensitising action using 1 per cent. of the dye to the AgBr present. There are several slight differences between the sensitiveness of this emulsion and the former containing more dye. With less exposure sensitiveness begins at C$\frac{2}{3}$D, rises to a narrow maximum just before D, descending thence by two broad steps to nothing at E$\frac{1}{3}$F, showing only a little blue violet sensitiveness beyond. With longer exposure the curve is very similar, but more extended, as shown. The absorption is very similar to that of the more intensely dyed plate, the variation naturally following the sensitiveness curve of the former (less dyed emulsion).

Phloxin (Tetrabromdichlorfluorescein, $C_{20}H_4Cl_2Br_4O_5K_2$).—Is very similar in its physical behaviour to Rose Bengal. It is easily soluble in water, and with $AgNO_3$ forms a precipitate not very soluble in water. In gelatine it exhibits two absorption bands, the first commencing at D$\frac{1}{4}$E, reaching a maximum at D$\frac{1}{3}$E. The second and principal maximum occurs at about D$\frac{3}{4}$E to E, after which it descends, at first rapidly and afterwards more slowly, towards F. Tetrabromdichlorfluorescein-silver in gelatine shows some displacement of the chief absorption band towards the less refrangible end of the spectrum, but not so much as in the case of Rose Bengal.

For sensitizing purposes I found that ·1 gram phloxin to every 2 grams of the AgBr contained in the emulsion gave excellent results. It sensitises for three spectral districts. The least refrangible, and by far the most important, commences at C$\frac{1}{2}$D, rapidly rises to a maximum, but becomes a minimum at D to D$\frac{1}{3}$E. The second begins at D$\frac{1}{3}$E, reaches a maximum at D$\frac{1}{2}$E, thence to a minimum of sensitising action which is maintained for some distance. The third sensitising band lies between E and F, but is not of much importance. The blue-violet sensitiveness is but trifling.

The absorption shows two maxima. The less refrangible, which reaches a maximum at D, is but little displaced in regard to the sensitiveness-maximum to which it corresponds. The chief absorption begins at D$\frac{1}{3}$E, quickly reaches a maximum, but descends again at E—quickly at first but afterwards more slowly—towards G, after which it again rises. The bands of absorption maxima by no means agree in intensity with those of sensitising action. The least refrangible sensitised band is by far the most important whilst this is represented by a band of medium absorption; the middle sensitised band, which is by no means great, is yet represented by a band of great absorptive power.

Rhodamine.—I may here conveniently consider the sensitising and absorptive action of this dye; as it bears some distant relationship to the eosin series, being a dimethylamidophthalein. Rhodamine is easily soluble in water, the silver salt also being readily soluble, much more so than the corresponding eosine salt.

A gelatine film stained with the dye shows an intense absorption band in the yellow-green, and, in comparison with that of eosin, more towards the less refrangible portion of the spectrum. The absorption begins at a little on the more refrangible side of D, rising at once to a maxim as far as D$\frac{2}{3}$E, after which it descends first rapidly and afterwards slowly, and ends just before reaching F.

For sensitising purposes I used amounts of the dye varying from ·05 to 2 gram to every 2 grams AgBr employed, and with ammonia. Curve No. 141 represents the sensitiveness of an emulsion containing less than 10 per cent. of the dye to the AgBr present. Sensitiveness begins at C½D, reaching a maximum equally on both sides of D. Beyond D it descends rapidly at first, thence gradually, and ends at F, showing but little sensitiveness beyond.

The absorption of this emulsion (Curve No. 51) begins at D⅓E, rapidly rising to a maximum on both sides of D½E, after which it decreases, rapidly at first and gradually afterwards, ending at a little beyond F, and in the blue absorption again commences.

With an emulsion containing less dye I got a very similar curve of sensitiveness (No. 47) and of absorption (No. 54).

Corallin.—This dye is soluble in alcohol and water, and $AgNO_3$ gives no precipitate. In a gelatine film it is characterised by a strong absorption in the blue (in alcohol and water it is between the yellow and green). Absorption begins at D, and does not rise specially until E, after which it gradually becomes greater and attains its maximum at F, and then gradually descends till about G, beyond which it shows a certain degree of continuous absorption.

For colour-sensitising I used quantities varying from ·05 to 2 gram for every 2 grams of AgBr present. Its sensitising action consists of a strong band extending on both sides of D, descending rapidly to D⅔C on the one side, and on the other side rapidly at first to D½E, but afterwards more gradually to nothing just before F; beyond F blue-violet sensitiveness begins, and varies inversely according to the amount of dye present.

In corallin-dyed emulsions the maximum of absorption and maximum of sensitising action are very widely displaced. The absorption may be considered to begin only at D, and not to reach its maximum much before F, after which it keeps pretty uniform to the end of the visible spectrum.

With another dye of this series, Fluorescent Resorcin blue, I made one or two experiments; but, from the nature of the dye, successful results can hardly be expected. It shows, however, a weak colour sensitive band from *a* to B½C. An absorption result was impossible.

Of the so-called azodyes I tried *azoblue.* In a gelatine film this dye shows a wide but not very intense absorption, chiefly in spectral yellow; it begins at C$\frac{1}{3}$D, reaching a maximum at a little before D, at D$\frac{1}{4}$E it gradually becomes less, and nothing at a little beyond E.

For colour-sensitising purposes about ·05 to ·1 gram to every 2 grams AgBr present is a suitable quantity to employ, with about ·05 $AgNO_3$. Spectral sensitiveness begins on the less refrangible side of A, but does not begin to rise much until *a*, but at B it reaches a maximum, from which it descends to almost nothing at D, remaining stationary until the beginning of blue-violet sensitiveness, when it quickly rises to its principal maximum.

The absorption of this emulsion commences at just before C, rises gradually until D, after which it keeps pretty uniform until past the blue, when it again rises.

Of natural dye-stuffs I have not tried many. *Chlorophyll* gave me many uncertain results. Curves of one of the more successful are shown. The sensitiveness curve may be considered to consist of at least three bands in the less refrangible part of the spectrum. The first rises to a maximum between B and C, the second just before D, and the third between D and E. Beyond E it again increases, and shows intense blue-violet sensitiveness.

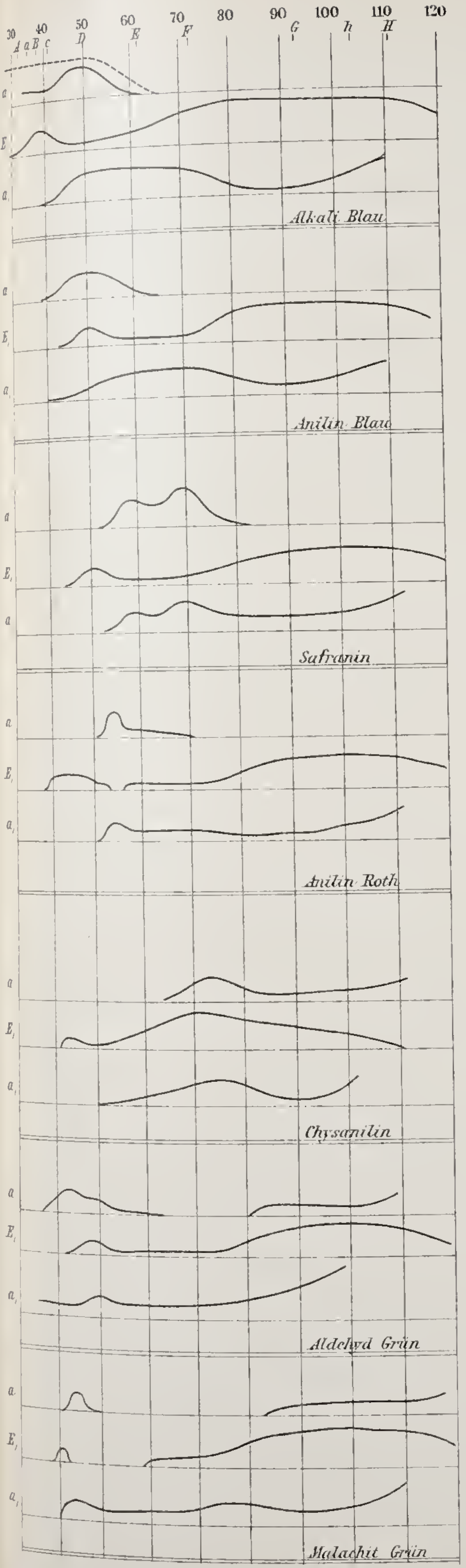
The absorption of this emulsion is indicated as regards the less refrangible band. This begins at a little before C, attains a maximum at C$\frac{1}{3}$D, after which the absorption is not sufficiently clear to be accurately drawn.

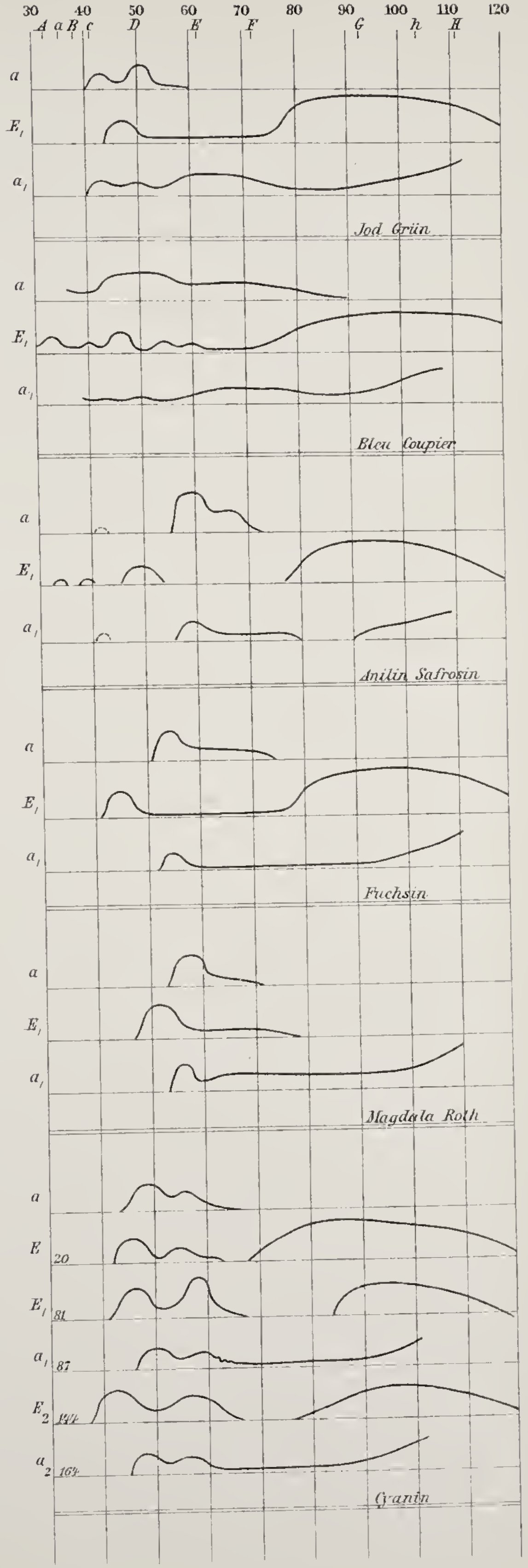
Beyond those already described, I have experimented, though unsuccessfully, with the following :—

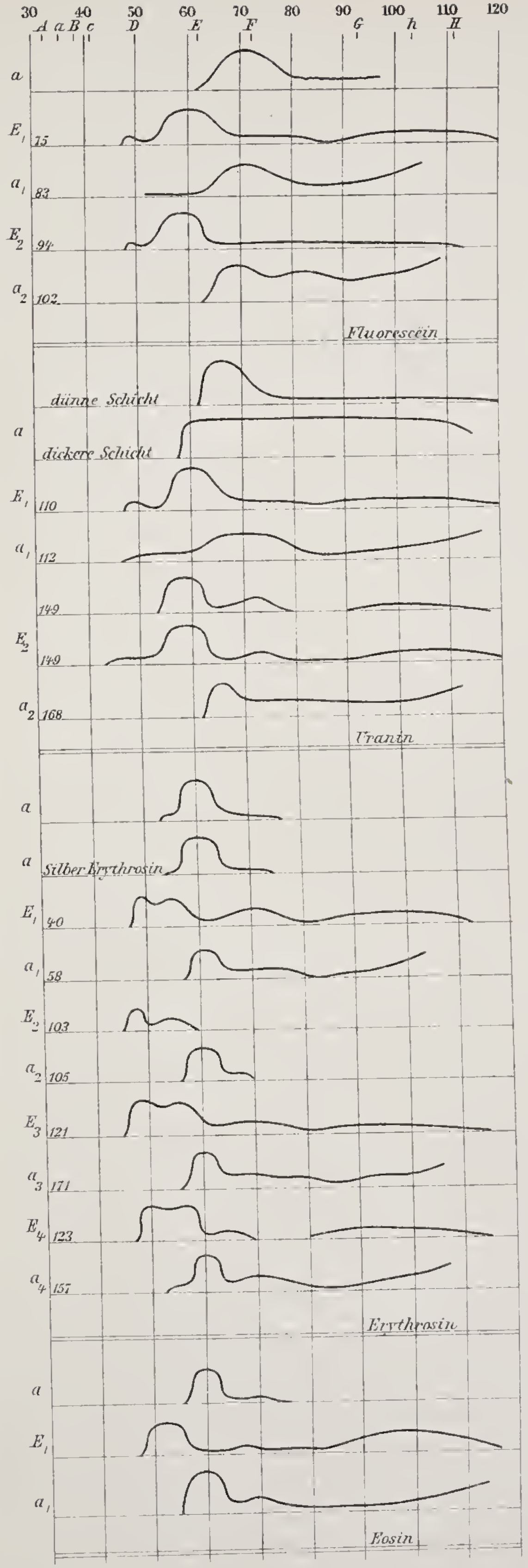
Coerulein.—I obtained from Dr. Schuchardt a sample of coerulein sulphite (Coerulein S.). With this dye I was unable to get any appreciable colour-sensitiveness in the less refrangible part of the spectrum.

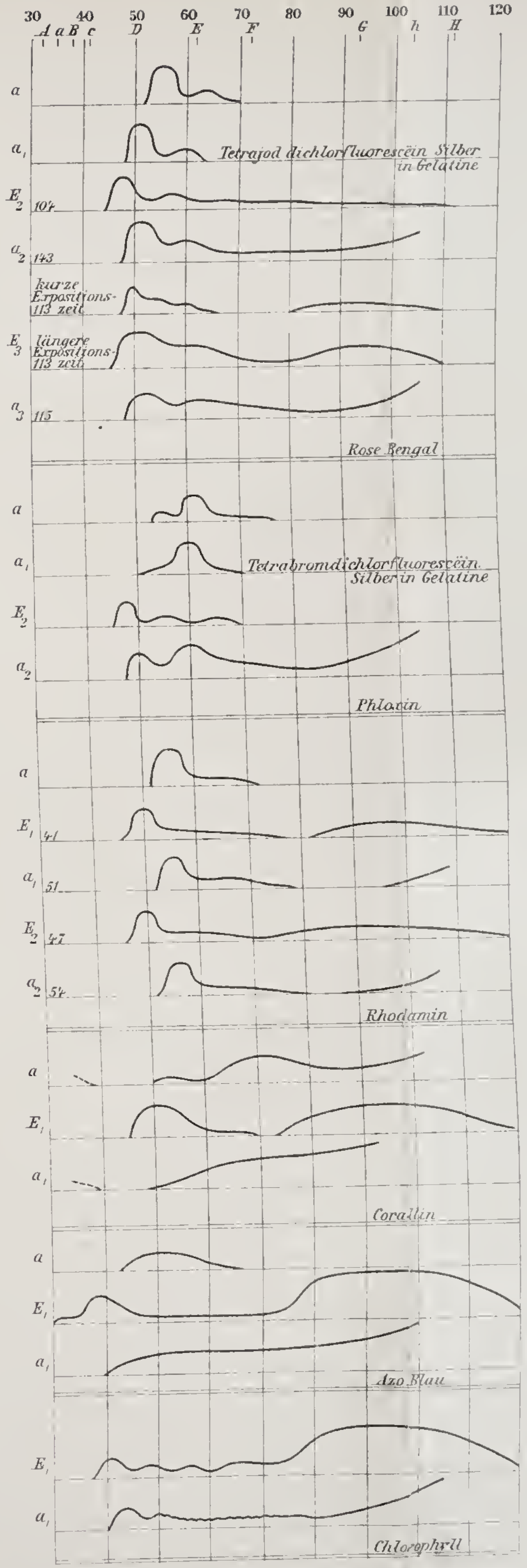
Naphthol Blue.—Caused my emulsions to fog on development.

Methyl Blue.—This dye in gelatine shows two intense absorption bands—one in the orange, and the other in the red. I was particularly anxious to get results with this dye, and I tried every

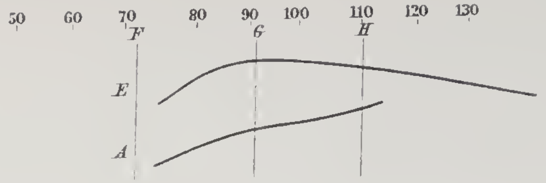




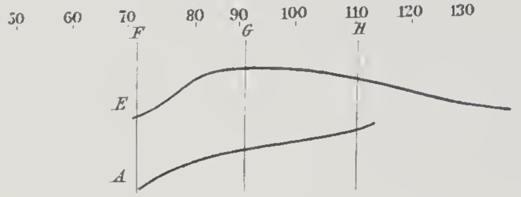




Nº1. Ag Br



Nº2. Ag Br



Nº3 Ag Br

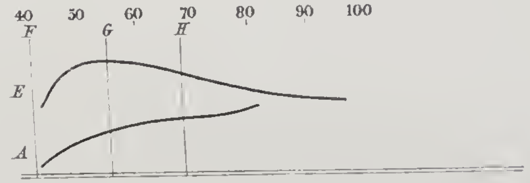


Fig1.

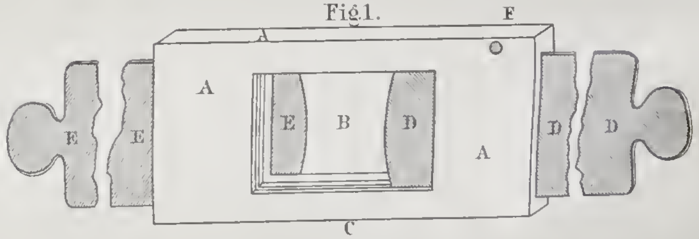


Fig2.

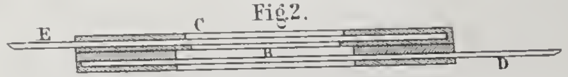


Fig3.

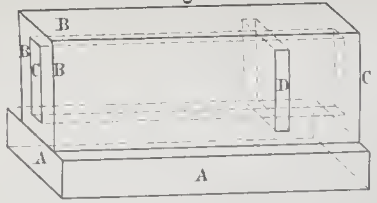
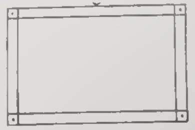


Fig4.



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means with this object in view, without any success. Every result would fog on development, do all I could to prevent it. The quantities of the dye I used varied from 1 to 2½ per cent. to the AgBr present in the emulsion, and most of the emulsions showed splendid absorptions.

With colours of the *Alizarin* series I was also unsuccessful. I experimented with alizarin, alizarin blue, and purpurin. The cause of failure here was the difficulty I experienced in dissolving these bodies. With purpurin I tried several plans for getting an extra quantity of the dye into the emulsion, but without satisfactory results.

REFERENCE NOTE TO DRAWINGS. The curve marked "a" on the top line in each division refers to the spectral absorption of the dyed gelatine film alone.

E_1 refers to the sensitiveness curve of the dyed gelatino-bromide emulsion.

a_1 refers to the absorption curve of the same dyed gelatino-bromide emulsion.

E_1 and a_1, E_2 and a_2, E_3 and a_3, etc., in every case refer to the same dyed emulsion.

GENERAL RESULTS.

For the easy comparison of the foregoing results I have placed them in tabular forms. The numbers in the first table refer to the millimeter scale. It represents all the sensitiveness bands with their maxima, and the absorption bands with their maxima, as well as for the simple stained gelatine, as also for the dyed silver bromide emulsion.

x_1, x_2, x_3, are sensitiveness-*bands* under "sensitiveness,"
and absorption-*bands* under "absorption."

y_1, y_2, y_3, are sensitiveness-*maxima* under "sensitiveness,"
and absorption-*maxima* under "absorption."

In the second table the wave-lengths are given both for the sensitiveness-bands with their maxima, and also the absorption-bands, together with their maxima for the dyed emulsions.

If we compare the wave-lengths of absorption-maxima and sensitiveness-maxima, we find that: THE POSITION OF SENSITIVENESS- AND ABSORPTION-MAXIMA OF THE SAME PLATE DO NOT AGREE. THE LATTER ARE DISPLACED TOWARDS THE MORE REFRANGIBLE PART OF THE SPECTRUM.

TABLE I.

Name of Dye.	Absorption in Pure Gelatine with Dye.						Absorption in Gelatino-Silver Bromide with Dye.						Sensitiveness of Dyed Emulson.					
	x_1	y_1	x_2	y_2	x_3	y_3	x_1	y_1	x_2	y_2	x_3	y_3	x_1	y_1	x_2	y_2	x_3	y_3
Alkali Blue. .	40—59	49	—	—	—	—	42—80	60	—	—	—	—	32—47	39	—	—	—	—
Anilin Blue .	40—61	50	—	—		—	43—85	70	—	—	—	—	43—56	51	—	—	—	—
Safranin . . .	53—63	59	64—80	69,5	—	—	54—63	59	63—80	69.5	—	—	45—57	51	—	—	—	—
Anilin Red . .	51—57	54.5	—	—	—	—	52—59	55	—	—	—	—	39—54	45	—	—	—	—
Chrysanilin .	—	—	64—83	75	—	—	—	—	54—90	75	—	—	42—48	44	52-110	70	—	—
Aldehyde Green	37—48	44	48—54	50	—	—	—	—	47—53	50	—	—	—	—	43—53	48	—	—
Malachite Green	42—48	44.5	—	—	—	—	40—50	45	—	—	—	—	39—44	41	—	—	—	—
Iodine Green .	40—46	43	46—53	50	—	—	40—47	43	47—53	50	—	—	—	—	44—51	47	—	—
Blue Coupier .	40—58	—	—	—	—	50	—	—	—	—	48—52	50	30—35	33	38—42	40	43—49	46
Anilin Safrosin	41—43?	42?	56—64	59	64—72	66	41—43?	42?	56—65	59?	—	—	38—40[1]	39	46—54	50	—	—
Fuchsin . . .	51—57	55	—	—	—	—	52—57	55	—	—	—	—	41—50	45	—	—	—	—
Magdala Red .	54—61	58	—	—	—	—	54—60	57	—	—	—	—	47—57	52	—	—	—	—
Cyanin . . .	44—53	49	53—60	56	—	—	45—52	48	52—62	57	—	—	38—49	43	50—65	57	—	—
Fluorescein .	—	—	61—80	72	—	—	—	—	62—80	72	—	—	47—50	49	52—70	60	—	—
Uranin . . .	—	—	62—77	66	—	—	—	—	61—83	71	—	—	47—51	49	53—70	60	—	—
Erythrosin . .	—	—	53—67	60	—	—	—	—	57—67	61	69—80	75	47—51	49	52—62	55	62—80	71
Eosin . . .	56—64	60	68—72	70	—	—	55—65	60	66—74	70	—	—	47—58	53	66—70	68	—	—
Bengal Red. .	52—60	56	60—69	63.5	—	—	48—56	52	56—64	60	—	—	45—51	47.5	53—62	58	—	—
Phloxin . . .	53—57	54.5	58—66	61	—	—	47—54	50	54—66	60	—	—	45—51	48	52—59	56	61—68	65
Rhodamin . .	51.5—60	55.5	—	—	—	—	52—60	55.5	—	—	—	—	46—54	50	—	—	—	—
Corallin . . .	50—57	53	58—80	72	—	—	50[2]						46—60	51	—	—	—	—
Azo-blue . .	43—63	52	—	—	—	—	40[2]						35—47	39	—	—	—	—
Chlorophyll .	—	—	—	—	—	—	40—47	44	—	—	—	—	38—46	41	46—52	49	53—60	56

[1] Before this Band lies yet another at 33–35, with the Maximum at 34.

[2] Increases to a Maximum.

TABLE II.

Name of Dye.	Absorption in Gelatino-Silver Bromide with Dye.						Sensitiveness of Dyed Emulsion.					
	x_1	y_1	x_2	y_2	x_3	y_3	x_1	y_1	x_2	y_2	x_3	y_3
Alkali Blue . .	6480—4620	5315	—	—	—	—	7604—6090	6760	—	—	—	—
Anilin Blue .	6385—4485	4920	—	—	—	—	6385—5515	5825	—	—	—	—
Safranin . . .	5635—5180	5865	5180—4620	4935	—	—	6225—5465	5825	—	—	—	—
Anilin Red . .	5760—5865	5575	—	—	—	—	6760—5635	6225	—	—	—	—
Chrysanilin .	—	—	5635—4350	4770	—	—	6480—6025	6300	5760—3980	4920	—	—
Aldehyde Green	—	—	6090—5695	5890	—	—	—	—	6385—5695	6025	—	—
Malachite Green	6605—5890	6225	—	—	—	—	6760—6300	6582	—	—	—	—
Iodine Green .	6605—6090	6385	6090—5695	5890	—	—	—	—	6300—5825	6090	—	—
Blue Coupier .	—	—	—	—	6025—5760	5890	7860—7200	7470	6867—6480	6665	6385—5960	6155
Anilin Safrosin	6582—6385?	6480?	5515—5100	5865?	—	—	6867—6650[1]	6705	6155—5635	5892	—	—
Fuchsin . . .	5760—5465	5575	—	—	—	—	6582—5892	6225	—	—	—	—
Magdala Red .	5635—5315	5465	—	—	—	—	6090—5465	5760	—	—	—	—
Cyanin . . .	6225—5760	6025	5760—5225	5465	—	—	6867—5960	6380	5892—5100	5465	—	—
Fluorescein .	—	—	5225—4620	4860	—	—	6090—5892	5960	5760—5315	5315	—	—
Uranin . . .	—	—	5270—4535	4890	—	—	6090—5825	5960	5695—5315	5315	—	—
Erythrosin . .	—	—	5465—5020	5270	4950—4620	4770	6090—5825	5960	5760—5225	5575	5225—4620	4890
Eosin . . .	5575—5100	5315	5060—4800	4920	—	—	6090—5415	5693	5060—4920	4985	—	—
Bengal Red .	6025—5515	5760	5515—5140	5315	—	—	6225—5825	6060	5695—5225	5415	—	—
Phloxin . . .	6090—5635	5890	5635—5060	5315	—	—	6225—5825	6025	5760—5865	5515	5270—4985	5100
Rhodamin . .	5760—5315	5550	—	—	—	—	6155—5635	5892	—	—	—	—
Corallin . . .	5890[2]	—	—	—	—	—	6155—5315	5825	—	—	—	—
Azo-blue . ,	6605[2]	—	—	—	—	—	7200—6090	6750	—	—	—	—
Chlorophyll .	6605—6092	6300	—	—	—	—	6867—6225	6582	6155—5760	5960	5695—5315	5515

[1] Before this Band lies yet another at 7460—7200, with the Maximum at 7330.

[2] Increases to a Maximum.

The following facts are to be noted :—

1.—In a few cases the displacement is very trifling, as with aldehyde green, phloxin, Bengal red, and one of the cyanin bands. In other cases it is very important, as with fluorescein, fuchsin, etc.

2.—If two sensitiveness-maxima and two absorption-maxima exist, the order of intensity of the first may be reversed in the case of the latter, as with cyanin, etc.

3.—If there appear two or more absorption-maxima, there may be present no corresponding sensitiveness-maxima for one or more of the same, as with iodine green, safranin, etc.

4.—The displacement is very different for the different absorption and sensitiveness-maxima, as above indicated ; and likewise may be for the maximum of sensitising action of the same dye-stuff itself, as with cyanin, if it be added to the different haloid salts or modification of the same.

5.—The experiments of Messerschmidt, Eder, and others upon the positions of absorption-spectra of gelatine films which were stained with dyes, and the sensitiveness-maxima of similarly dyed plates, can likewise be deduced as a support for the above results. If we compare the wave-lengths above indicated of the absorption maxima of the coloured gelatine film alone with the absorption maxima of the dyed gelatino-bromide of silver, we find, as a general rule, that they not only correspond, but in most cases very nearly agree. There appears in some cases, however—as, for instance, with phloxin and Bengal red—an important displacement, and especially by one of the absorption bands of Bengal red. In these cases, however, the dye was in close combination with silver, which has to be taken into consideration.

Lastly.—The displacement of the maximum of sensitiveness in regard to the maximum of absorption has not its cause in the greater dispersion or density of silver bromide films, but finds its full explanation in the above communicated theory of Professor E. Wiedemann.

J. J. ACWORTH.

IDEALISM.

THE enterprising traveller, who is being shown over the ancient Royal Palace of Holyrood, on approaching Mary Stuart's apartments, notices some small dirty marks on the floor, and, thinking them the result of some careless painter's negligence, is about to pass on when he is stopped by his gossiping cicerone with the remark, "Those are the marks of Rizzio's blood." Instantly the whole scene flashes before him,—the fierce conspirators with their cruel swords; the wretched Italian livid with terror; and the beautiful but unfortunate Queen imploring on bended knees the life of her too faithful secretary. What occult influence raises all this vivid picture before the traveller's mind's eye? It is the magician-like power of Idealism.

What then is Idealism? Most people have a dim notion of the cult, but few of them can give a definition of it. Perhaps the dictionary will help us. Here we find it set down as the formation of an eclectic standard by taking the beautiful of the many to form the perfection of the one. Idealism may also be described as the art which takes the commonplace and clothes it with an imaginary halo of interest, pathos, mystery, terror, or any other quality which strongly influences the human mind. Thus the mediæval painters limned the portrait of an ordinary woman, and by the magic of their art idealised it into a Virgin Mary or St. Catharine. Orpheus in the ancient legend took a common lute, and by his ideal playing made the hard rocks and dull trees follow him. And whilst few subjects appear less idealistic than the coarse hemp, ill-smelling tar, and filthy grease in constant use at every manufactory of hempen cords; no one can read Longfellow's beautiful poem "The Rope-walk" without feeling his whole nature thrilled by its exquisite pathos and delightful imagery.

True idealism elevates and dignifies every action of our life, so that even menial duties are performed with a feeling of pleasure. The mother is proud of her fretful babe, because it is her beau-ideal of a lovely child. The "volunteer is worth two press'd men," because he has an ideal. And did not Florence Nightingale and other ladies go out and brave the rigours of a Crimean winter that they might show to all men the personification of an ideal nurse?

It is this inspiring influence, or the want of it, which must make or mar our photographs. If they are to minister to our tender sentiments, and to raise our best aspirations to a higher level, we must make them something more than mere matter-of-fact examples of clean and careful manipulation. How uninteresting is the ordinary likeness! It is like that terrible item in a picture catalogue, "Portrait of a Gentleman." What gentleman? Why a gentleman? Why *this* gentleman more than any other gentleman? And the price at which it is presently sold is but too faithful a criterion of the value at which the world appraises it. If this figure, however, had formed part of a subject group, or were the focus of a carefully arranged composition,—such as that of a scene from "John Halifax," for instance,—then this "Portrait of a Gentleman" would have been an object of general interest.

One great faculty of idealism is to honour the remains of departed greatness, such for instance as little articles formerly used by distinguished people: as witness the sum of £790 which was once paid for a tooth of Sir Isaac Newton to set in a ring, or the £500 paid for the pens used in signing the Treaty with America. Is there not also at the present time open an exhibition of the *personalia* of the Royal Georges? And do we not preserve in the British Museum, with the greatest care, the autographs of old-time celebrities? The empty cask still smells of the generous wine it once contained. The house which formed the dwelling of departed notabilities is still idealised by the hero-worshippers, and most properly indicated by a memorial affixed to its front wall,—as witness the house in Upper Baker Street, where may be seen a tablet to the memory of Sarah Siddons, the great tragedienne ; and the house in Adelphi Terrace, overlooking the Royal Thames, wherein Garrick used to receive his friends and make merry with them. Who does not make a pilgrimage to Stratford-on-Avon, to the shrine of the great author, William Shakespeare, to examine the little low room wherein he first saw the light, with its walls and ceilings covered with pencillings ? How many times, and in how many manners, has not the quiet little house in Henley Street been photographed, etched, engraved, and painted ? How lovingly and reverently have not collectors purchased and treasured up first editions of his works, variations of his text, folios and quartos and foreign translations ? Has not a Memorial been built in his native town, costing thousands of pounds ? And all this because his proud countrymen have made him their beau-ideal of authors ! How we anathematise that wretched occupier of New Place who chopped down the mulberry tree which Shakespeare's own hand had planted, to save himself the trouble of showing it to pilgrims who came to see it ! That man may well form our ideal of a Vandal.

One of the most ideal uses of photography is to perpetuate, before the ruthless hand of the improver has laid its weight upon them, these ancient and perhaps already somewhat dilapidated relics of bygone distinction. How should we not value now photographic views of London as it appeared before the Great Fire ! What would we not give for a true subject portrait of Milton or Chaucer ? The idea has been already mooted that a collection of standard photographs should be enshrined in some imperishable magazine, so as to give to future ages the boon denied to our own. And there is one society, at least, which has set itself the task of delineating the natural features of a particular district, apportioning the work amongst its members, and concentrating their productions. This is most valuable idealism, as most of us, even in middle life, cannot fail to notice the immense changes which have taken place in the streets and alleys of our native places,—the old and often very picturesque order making room for the perhaps simply utilitarian new. How interesting would be photographs of mediæval attire; silver plate which was melted down in Charles I.'s time; books, MSS., etc., destroyed at the suppression of the monasteries, etc. Everything, in fact, which has a history, or tells any kind of story ought to be crystallised on to paper, so as to be of easy reference and undeniable accuracy.

Idealism, although apparently associated chiefly with culture and refinement, often spreads its influence over a wider area. Thus the working man who has acquired a little learning feels himself raised a step above his ignorant neighbour. The *nouveau riche* soap-boiler fills his drawing-room with works of art of which he knows nothing whatever, except the price he paid for them. Our republican brothers across the Atlantic look on with great complacency when their *millionairesses* nestle their heads beneath an English coronet. And in spite of Burns' sweeping assertion that "rank is *but* the guinea stamp," there is a mystic power in social idealism, in culture, honour, and distinction, which ever draws unto itself all that is noblest and best in our nature.

Natural scenery—*i.e.* landscape pure and simple—has beauties of its own which, indeed, are indescribable,—beauties of form, disposition of parts, varying light and shade, tint and hue. But the artist or photographer cannot invest these with an added ideal unless he employs them as backgrounds for figure compositions. There is, I believe, no landscape school at the Royal Academy, perhaps for this reason; and an examination of the pictures at the National Gallery shows that every *landscape* there—excluding, of course, "animal pieces" and "still life"—contains human figures; some prominent and essential to the composition,—as, for instance, Queen Dido, superintending the building of Carthage; whilst others are in retreat, giving life, and contrast to the verdure only. So that evidently all our authorities consider the human form divine in some position or other absolutely necessary to every landscape.

But even here no truly ideal work can be done until the mind of the worker is imbued with ideal feeling. Peter Bell's "Primrose by the river's brim" will remain always a primrose to them until they discover, like Mrs. Scott-Gatty did, what exquisite "parables" Nature, when rightly interpreted, can furnish. Mrs. Cameron, Mr. Robinson, Mr. Gale, have all had to learn the principles, characteristics, and influence which idealism exercises upon commonplace objects before they could produce their beautiful works of art. One of the best and most fruitful sources of inspiration is a visit to a good art gallery, and a careful study of the work of old and established masters, so as to find out the principles upon which they constructed their drawings. We must compare one with the other, and notice why Turner placed a boldly drawn tree in the foreground, so as to throw back the distance and give a feeling of enormous depth to the painting; why Sir Joshua Reynolds insisted upon having three lights varying in quantity and degree of brilliancy and disposition in every picture; why Rembrandt drew a small strident bit of light, gradually diffusing itself into a profound depth of shadow; and why Claude Lorraine gives us usually a single mass of shadow of agreeable form, relieved against a light sky brightening up from the horizon. Because these effects are not the works of fortunate haphazard, but the result of the application of certain well-defined rules of composition, which, although used primarily in colour subjects and with landscapes, are the governing principles of all drawings, whether done by the brush or by the photographic lens.

Idealism has its painful side too, for human nature seems to have an instinctive habit of being ashamed of the clothes of its calling. An officer in the army throws aside his regimentals the instant he is off duty; clergymen are often to be seen in the autumn without the slightest indication of their "cloth;" the housemaid pulls off her cap; and if a policeman is asked for his portrait he presents himself attired in his Sunday best or in a suit of ordinary dittoes. And this brings one to a curious anomaly; for whereas the men portion of creation put aside their uniforms when off duty and on pleasure intent, young ladies who take up nursing as a profession do just the opposite, and seem to take a perfect pride in going abroad clad in all the glory of snow-white aprons and picturesque headgear.

And now mark the ideal value of these two different modes of attire. Let us notice what we see in the show-cases of the professional photographer. We will suppose a postman out of uniform has been taken. There he stands with the every-day regulation coat, waistcoat, and trousers, apparently pinned to the background like an entomological specimen ; his right hand resting on a dwarf pedestal, upon which stands a flower-pot with a spreading palm in it ; his left hanging by his side, and an inane look on his face. What story does this tell ? What interest will it excite ? What chord of sympathy can it touch ? But now let us take the same person and put him in different circumstances ; let us dress him in his uniform, and give him his bag of letters ; let us place him at the front door or front gate of a picturesque house, the door half opened, and perhaps a servant-maid with outstretched hand thereat, the postman searching his leather bag for a letter, and the lens so placed that it embraces a view down the street to give distance and atmosphere ; let us entitle this "A Man of Letters," and we have a picture, and an ideal one too ; for what heart is there so callous that it has never hoped or feared the advent of the postman ? A portrait of a man doing his daily duty is a pleasure to examine ; but it is a "weariness of the flesh" to look at a figure which is inanely and idly looking at you. All the difficulty arises from the want of moral courage of the sitters to put on their "every-day" appearance. It is not everybody who exhibits the courage of Cromwell, who reproved the painter for suppressing an ugly wart on his nose. When a man advanced in years is taken he considers it incumbent upon him to stiffen himself up and put on a juvenile appearance. When does one see the man leaning back in his old chair, with his eyes closed, his legs crossed, and a newspaper lying on his lap ? Yet a visitor to the National Gallery, in the British Section, will see in "No News," by T. S. Good, how admirable a picture these elements produce. The same may be said of Stacy Marks' "Bit of Blue,"—an old man examining some *bric-à-brac*, and surrounded with specimens of "blue;" and J. W. Nichols' "When a Man's Single he Lives at his Ease"—an interior with a bachelor smoking at his ease—all single-figure subjects. These examples, which might be multiplied *ad nauseam*, show how easy it is to throw a spell of poetry and interest over an object which by itself is commonplace and tame.

Of course the town professional, who has only his narrow and circumscribed studio to work in, has neither the means nor the opportunities of his brother amateur in the country, who can sally forth and select the particular scene which lends itself most readily and suitably to the purpose he has in view. His sitters, too, are in a hurry, and appointments must be kept, so he attempts impossibilities. Nothing is more common than to see a drawing-room figure standing on a seashore with a curtain projecting over part of the beach, or perhaps into the sea; or a bare-headed girl, in dinner dress, seated calmly in the open air in the midst of a wide landscape.

Why are the general run of backgrounds so hideously ugly? Why are they all so conventional, as though supplied ready-made by a wholesale firm? Why does not the photographer cudgel his brains, set to work, and form a composition which will give pleasure, as well as be useful to his patrons. Light fancy articles are so low in price now. Japanese fans, lanterns, paper curtains, earthenware, etc., can be purchased at a very small outlay; and the artist might by rearranging his materials have a fresh background every day. The illustrated papers every now and then give sketches of some of the studios of well-known artists, and there are many works treating of the decoration of dwelling-rooms which would furnish ample hints and examples for guidance,—all that is needed being the spirit to put them in practice.

With two figures the task becomes still easier,—the increase in the resources naturally opening up a wider range of subjects. Yet even here humiliation dogs the steps of the artist, as witness the comical painting now exhibiting amongst the Old Masters at the Royal Academy. It is by Zoffany, and is entitled "A Portrait Group." It represents an interior with two gentlemen, one being in orders. The latter sits, book in hand; whilst his younger brother stands holding his hat, and leaning against a chair. Neither figure is doing anything, nor pays the least attention to the other; and, if either or both were removed, the composition would remain of equal value. Yet this is the work of a Royal Academician!

This style of arrangement, however, seems to have found favour with many photographers, judging from specimens exhibited in their show-cases. No one seems to feel that the ordinary occupations of life offer plenty of incidents for immortalising. Thus one person helping another on with his coat, and entitled "A Friend in Need;" or another handing a chair to a lady, and entitled "Politeness;" or a man holding up a letter whilst he blinds the eyes of his sister, and entitled "What will You Give for It?" are suggestions of subjects within the reach of every one.

At a recent exhibition a young girl was represented pinning a flower into a man's coat, with a pretty scene behind, and the picture was entitled "Making a Gentleman of Him." "From Sunny Seas," by Stacy Marks, is a good ideal for two men,—the old father seated before some maps in an interior, whilst the son in naval uniform is pointing out the course of his travels to him. The interest of this composition lies in the story which it tells of the young sailor leaving his old father to voyage into seas unknown, to encounter sharp perils, meet with strange adventures, and finally come back safe and sound at last to the old homestead; all which story the spectator's mind naturally tells for itself as he gazes at the admirable presentment of it. And the same kind of pathetic interest is aroused by the picture "Going Home,"—an old Chelsea pensioner, leaning heavily on his daughter's arm as they pass through a flower-decked lane, with a wooded landscape stretching far away behind them. No one can look upon such every-day subject pictures without feeling a personal sympathy with the people represented. "One touch of nature makes the whole world kin."

How easy, too, to compose a picture similar to Marcus Stone's "In Love,"—a young man and a girl seated in an orchard on the two ends of a semi-circular garden-seat, the one glancing furtively at the other, who is intent on her work. Or the same two, back to back, and suitably placed with a proper background, and entitled "A Slight Misunderstanding." "The Rift in the Lute," by Orchardson, is also a two-figure composition,—the distant back view of a lady quitting an interior, whilst the gentleman stands up in an attitude of outraged dignity.

Three-figure compositions are still easier to form. For instance, a lady seated in a garden in the attitude of telling an anecdote, whilst two other persons seated at an afternoon tea-table form the audience, and entitled "Social Scandal," make a very pleasing picture. Or a girl wrapped up and supported by pillows in a high arm-chair, and some sympathising visitors near, and entitled "Convalescent;"—something similar to this by Birket Foster appears in one of the contemporary magazines. Or a girl at a table weeping, whilst a visitor reads the letter which has just brought the tidings, and a sympathetic friend near, form "Sad News."

In fact, there is no lack of materials for ideal pictures, if only the spirit be present. What we should do is to notice every incident around us, and make a little rough—very rough—sketch of our idea and of the disposition of its salient features. And then, when time and opportunity offer, we have only to arrange our materials in the order of our sketch, and the thing is done.

FRED DAVIS.

THE TEACHINGS OF A CHEMICAL ACTINOMETER.

IN all branches of science, the study of the qualitative nature of the changes produced by the various forces called into play has ever been the precursor of attempts to measure these changes, or, in other words, to examine quantitatively the work effected by the agent investigated.

Even before France had "endowed the world of science and of art with one of the most wonderful discoveries that honour" that country, the first suggestion of a method for measuring the intensity of the so-called actinic rays had been made by De Saussure in 1790, who proposed to make use of Berthollet's discovery, that chlorine water is decomposed by light with the formation of hydrochloric acid and the liberation of oxygen, for this purpose. Daguerre's discoveries gave a great impetus to the study of this subject; and in 1843 we find De Saussure's method elaborated by Wittwer and Draper's hydrogen and chlorine actinometer introduced. These instruments soon found competitors of very varying efficiency, and to-day the number of instruments devised for measuring the actinic power of the sun's rays, entitled actinometers, actinographs, photometers, sensitometers, etc., is truly legion. Their method of working depends upon the production of certain measurable changes due to the acting light, this change being proportional to the amount of chemically active rays contained in the light.

It is convenient to distinguish the following three classes of actinometers—a classification which, if not scientifically accurate, possesses the recommendation of practicability—

I.—Chemical Actinometers.

II.—Physical Actinometers.

III.—Photographic Actinometers.

In the chemical actinometers the degree of change taking place in the substance or substances employed is measured either by means of the ordinary methods of chemical analysis, or else by virtue of some property—such as solubility—possessed by the body or bodies formed as the result of a definite chemical change.

Under the head of physical actinometers must be included those instruments whose action depends upon purely physical changes due to light, such as the electrical actinometer devised by Siemens, which was based upon the fact that the electrical conductivity of selenium is increased by exposure to light; and the electro-chemical actinometer of Becquerel, in which the electric current set up between two silver chloride plates placed in a conducting solution—one of which was exposed to the source of light—was employed to measure the actinic power of the latter. The ingenious instrument recently devised by Hurter,* for the measurement of diffused daylight, would also be included in this class.

Coming to the photographic actinometers, the scientific inaccuracy of the above classification becomes apparent. In these instruments the photographic intensity of the light is judged by the degree of darkening of standard papers, prepared either with silver salts or with potassium bichromate—strictly speaking, therefore, a chemical change. As, however, the nature of the change itself still remains in the elementary qualitative state, and as the resultant action is judged by the visual effect only, the transgression is an admissible one. Under the varying titles of photometers, scale photometers, and sensitometers, instruments based on the above reactions, have proved themselves of great practical value for photographic and for printing purposes. Warnerke's phosphorescent photometer, and Ballard's very handy little instrument, in both of which the illumination of a phosphorescent plate is made use of, are also best included here. The recent researches of Thorpe on the glow of phosphorus have elucidated the chemistry of this phenomenon,† but as with the photographic papers it is the visual result that is employed to measure the actinic power of the light.

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* See *Journal of Society of Chemical Industry:* 1890, p. 370.

† *Nature*, April 5th, 1890.

Now, in connection with the whole subject of actinometry, there is one point of special importance to bear in mind, and which it will be well to consider before going further. It is well known to all photographers that the different parts of the spectrum affect sensitive substances to different extents. For instance, with silver chloride the maximum action is in the violet—at the Fraünhofer line H, with silver bromide and iodide in the blue (between G and F), whilst the molecular condition in which these haloid salts of silver are employed alters both the maximum point of action and also the range of action of the spectral colours. The photographing of the lines in the red and infra-red regions of the spectrum has been rendered possible by the fact that certain aniline dyes have the power of rendering the silver salts sensitive to the less refrangible rays of light—yellow and red, and on this action ortho-chromatic photography is based. In measuring, then, the actinic power of light by any means, chemical or otherwise, these measurements are of accurate value only in so far as they apply to the one substance employed and to this under certain well-defined conditions. For practical purposes however, it is sufficient if the coincidence between the portion of the spectrum acting upon the sensitive media employed for actinometrical measurements on the one hand, and the sensitive plate or paper on the other, is approximate, so that the relative values obtained by the former are applicable to the latter. The combination of hydrogen and chlorine is effected by the more refrangible rays—the same rays that exert the greatest action on the halogen salts of silver; and hence the hydrogen and chlorine actinometer gives results which hold more or less approximately for these salts, but they would not hold for ortho-chromatic plates—or for the recently described printing methods with the primuline colours—which last are acted on more in a ratio to the visual intensity of the spectrum. The daily use of the ruby lamp in the dark-room renders further enlargement on this point unnecessary. All that has to be remembered in connection with actinometry is, that the relative results obtained are strictly accurate only for certain rays of light, viz.—those rays which act upon the substance or substances employed in the measurement itself.

With this in our minds the true value of chemical actinometers in their relation to exposure tables and practical photography is clear—their value from a scientific standpoint begins and ends with themselves individually; each sensitive medium must be its own actinometer.

The most accurate and the most thoroughly investigated of all chemical actinometers is the one which depends for its action upon the combination of hydrogen and chlorine when exposed to light. This combination, which results in the formation of hydrochloric acid, takes place with explosive violence in sunlight, but only gradually in diffused daylight, thus rendering a measurement of the action of the light possible, provided a means is at hand for finding how much hydrochloric acid has been formed. This is readily effected, owing to the solubility of the hydrochloric acid in water (one volume of water dissolves about 450 volumes of hydrochloric acid gas at ordinary temperatures), under conditions into which we will now inquire.

In the first place it is necessary to prepare a mixture of hydrogen and chlorine in the exact proportion required for their complete combination, without having a residue of either gas; and this is effected by passing an electric current through hydrochloric acid of specific gravity 1·48—the solution being electrolysed between carbon electrodes. Three or four Bunsen cells are sufficient for the decomposition of the acid, and after the gaseous mixture has been evolved for a sufficiently long time to completely saturate the hydrochloric acid with chlorine, it is found to be of constant composition, and to consist of one volume of hydrogen to one volume of chlorine.

Secondly, the liquid used to absorb the hydrochloric formed must be perfectly saturated with the mixture of hydrogen and chlorine before taking any measurements; otherwise, the ratio of the two gases will be undergoing continual change on account of their different solubilities in water, and further, the contraction of volume noted will not be entirely due to the hydrochloric acid formed. These, together with some other points, were not sufficiently considered by Draper in the construction of the first hydrogen and chlorine actinometer—called by him "tithonometer," but Bunsen and Roscoe recognised the value of this gaseous mixture for actinometrical work, provided certain sources of error to which it was liable could be overcome, and this they themselves succeeded in doing.

The instrument in the hands of these investigators assumed the form of a bulb, provided on the one side with a tube, through which the mixture of hydrogen and chlorine entered, and on the other with a second tube, provided with a water-lute, and having a divided scale attached to it. The capacity of the bulb was 2 to 3 cubic centimetres; its lower half, which was blackened, was filled with water, through which the electrolytic gases passed to the upper portion where they could be exposed to the light to be measured. In making this exposure, all possible precautions were taken to guard against any direct heating of the mixture. Suppose now that diffused daylight be allowed to fall on the upper portion of the bulb—hydrochloric acid would be formed, and immediately absorbed by the water in the lower portion of the bulb, thus causing a diminished pressure in the apparatus, to adjust which the liquid in the water-lute would be drawn along the scale tube in the direction of the bulb to an extent proportional to the amount of hydrochloric acid formed. In such a piece of apparatus all the joints and stopcocks must be of glass, so as to be sure no absorption or diffusion, such as takes place when india-rubber stoppers are employed, could occur. The graduation of the scale tube can be effected by employing a standard light, and Bunsen and Roscoe used a coal gas or carbon monoxide flame, burnt under certain definite conditions, so that a constant light was obtained—and they showed that the results thus found are constant between 18° C. and 26° C. for one and the same so-called "insolation bulb," *i.e.* the bulb containing the mixed gases, already referred to. The fundamental laws of photo-chemical action were established by Bunsen and Roscoe's classical investigations, by means of this instrument. They showed that the photo-chemical action is proportional both to the inteusity of the light and to the time that the light acts, and that the rays producing this action, the so-called "actinic rays," obey all the ordinary laws of rays of light and of radiant heat. The knowledge of these laws enabled them to make their first measurements of the relation of the photo-chemical action both of diffused daylight and of direct sunlight to the sun's altitude with this hydrogen and chlorine actinometer—measurements which were succeeded by those with their silver chloride paper actinometer, which latter was found to be more applicable for such purposes. In taking the measurements with diffused daylight the quantity of hydrochloric acid formed in a given time, as indicated by the scale referred to above, was compared with that resulting when a standard light was employed under similar conditions, whilst with direct sunlight only a small portion of the sun's rays were allowed to fall upon the sensitive mixture. But although this instrument has passed away from the horizon of practicability, it has, in the hands of Bunsen and Roscoe, served to elucidate many important points connected with photo-chemical action, and it still serves—thanks to its simplicity—to offer a fruitful field of inquiry as to the why and wherefore of the photo-chemical action of light—a field on which we may now trespass without fear of prosecution.

All mechanical, physical, and chemical changes are governed by the great law of the conservation of energy—a law which has completely annihilated all hope of ever realising that happy dream of producing perpetual motion. Energy is as indestructible as matter is. The energy of the electric current can be used to convert water into its constituent elements, hydrogen and oxygen, and these gases can be brought together by suitable means to reproduce an electric current, but in neither case has any power been lost—the energy of the electric current has only been transformed into that of chemical separation in the former case, and the reverse has happened in the latter. Again, it is the electric current that serves to produce the gaseous mixture of Bunsen and Roscoe's actinometer, and this energy of chemical separation is rendered evident when the sensitive mixture is exposed to light. The photographer returning from his holiday carries energy home in the plates he is so anxious to develop, and which have only been rendered developable by the energy of the sun's rays to which they have been exposed—a change from the energy of radiant light to that of chemical separation. What, then, is the work done by the radiant light falling upon the mixture of hydrogen and chlorine? That work is actually performed is shown by the fact that the light, after having caused the combination of the two gases, is no longer in the condition in which it was originally: it can, after passing through a sufficiently long layer of the mixed gases, no longer induce the combination of the mixture in a second bulb placed behind the first. A certain portion of the light has been absorbed—in the case of the hydrogen and chlorine mixture, the blue, violet, and ultra-violet rays—the very rays that produce the combination of the two gases to hydrochloric acid. This fact is nothing more than the law of photochemical action enunciated by Draper in 1841, viz., "that photochemical decomposition is due to the absorption of certain rays by the bodies decomposed," a law which had been forestalled by Rumford as early as 1798, when he traced the chemical action of light as "due to heat, or if not, it is excited by the light which is absorbed by them" [the bodies acted on].

The simplest chemical equation expressing the formation of hydrochloric acid (HCl) from hydrogen (H) and chlorine (Cl) is as follows:—

$$\mathrm{H} + \mathrm{Cl} = \mathrm{HCl}$$—

and here, there is no decomposition taking place, no evidence of work for the absorbed light to perform, but the realisation of the energy of chemical separation, which is accompanied by the evolution of a large amount of heat—another example of the transformation and of the conservation of energy. But on looking into the matter more carefully there is some work for the absorbed light to do. The chemical elements, when in the free state are not in the condition of simple atoms, but in that of molecules, which, in nearly all instances, consist of two atoms—free hydrogen is really H_2—free chlorine Cl_2, and so on. When a chemical compound, such as hydrochloric acid, is decomposed into its elements, these at the moment of liberation from the compound, are in the condition of atoms ; but as soon as they are removed from the sphere of action of the decomposing force, the like atoms, which have a powerful attraction for one another, combine together to form the molecules H-H and Cl-Cl, the bond between the atoms being symbolic of the force of chemical affinity, by which they are held firmly together. Now just as these elements are freed from their compounds in the atomic as contrasted with the molecular state, so in all probability must they be in the same condition before they can re-enter into combination with atoms of another element to form a new compound, and this change is the work of the absorbed light in the case of the hydrogen and chlorine actinometer. The molecules of hydrogen and chlorine are split up into atoms ; and this done, then the liberated atoms can combine and form hydrochloric acid. This energy of radiant light has been changed therefore, in this instance, just as in that of the exposed plate, into that of chemical separation, and the chemical combination that results is a secondary phenomenon, best represented by the following equations :—

$$\text{(i)}\ H_2 + Cl_2 = H + H + Cl + Cl.$$

$$\text{(ii)}\ H + H + Cl + Cl = HCl + HCl.$$

This actinometer has, however, something more to teach us. Despite the fact that with the so-called " instantaneous plates " of to-day, successful photographs have been taken with exposures of only $\frac{1}{5000}$ of a second, it has long been known that the light does not affect sensitive surfaces instantaneously. A certain period of time is necessary—an infinitely short period in direct sunlight probably not longer than $\frac{1}{100000}$ of a second—in order to secure developable image. Becquerel did the first experiments on this subject some forty-eight years ago, and showed that if a plate after being exposed in the camera for only a short time—too short a time to give any result on development—were given a very short exposure to diffused light afterwards, a developable image of the subject would result, this action being traced to the fact that the second exposure augmented the action of the first, but was too short in itself to produce any effect upon those portions of the plate where no light had fallen previously. This "continuing" action of light was supposed by Becquerel to be due to the red and yellow rays of light (*rayons continuateurs*, as he called them), but it is now known beyond a doubt that it is the rays at the opposite end of the spectrum—the same rays that effect the initial change—that do this work.

With all sensitive media a certain period of exposure is necessary, before any observable change takes place. This phenomenon, to which Bunsen and Roscoe gave the name of "photo-chemical induction" was carefully and completely examined by these chemists by means of their hydrogen and chlorine actinometer. They found that the mixed gases did not combine instantaneously, and that when the combination did commence, it only started slowly, increasing gradually up to a certain maximum rate of combination, which was then maintained. The time necessary for the attainment of this maximum varies, but in no direct proportion, with the intensity of the light; and even with direct sunlight a certain short period was found to elapse before any change ensued. If the mixture, after being exposed, be placed in the dark for half an hour, induction takes place, just as if it had not been exposed at all.

Now what occurs during this period of photo-chemical induction? At first sight a very natural suggestion presents itself—viz., that the absorbed rays are spending their energy on the decomposition of the hydrogen and chlorine molecules into atoms, which, as we have seen, is the forerunner of the formation of the hydrochloric acid. That only a certain initial exposure might account for this is clear, when we bear in mind that when the decomposition of a certain number of molecules (the maximum number that can be decomposed by the light employed in the unit of time), has taken place and combination has resulted in consequence, other molecules would by that time be already decomposed, whilst a certain time would be necessary for the attainment of this condition—the rate of decomposition increasing gradually up to this point. In order to put this idea to the most satisfactory test possible—that of direct experiment—Bunsen and Roscoe exposed the two gases, chlorine and hydrogen, separately before mixing, and found that when mixed they behaved just as the unexposed gases did, the period of induction had to be passed through as before. This result appears, therefore, to dispel the above idea in its entirety, but there is a loophole through which it is worth while to creep. Since there is no doubt that the preliminary decomposition of the molecules of hydrogen and chlorine does take place; and since this change is due to the light absorbed by these molecules, they themselves must be in a position to effect this absorption. As a matter of fact, however, the hydrogen molecules by themselves absorb practically no light, whilst those of the chlorine on the other hand, absorb the very rays that effect the change in the sensitive mixture, so that it is not impossible that it is only when the former are in contact with the latter that the preliminary decomposition—the work of the absorbed light—can take place. Some recent researches by Pringsheim appear to show that the presence of water-vapour is essential for the combination of hydrogen and chlorine under all ordinary conditions. The exact bearing of this upon the facts that have been discussed in this paper would require more space than I have at my disposal. It is another of the many small causes of what have till lately been regarded as simple reactions—with which the chemist has been brought face to face during the past few years, and from which I believe he is destined to learn much as to the manner in which chemical changes—such as the one we have considered—actually occur.

CHARLES A. KOHN.

ROUND EUROPE.

I HAD thought to call this article "Round Europe by Sea," but, considering the fact that at least 1,600 out of the 7,000 miles traversed were by railway, I feared the title might be misleading; "Round Europe" is at any rate nearly correct, for starting by one of the P. and O. liners from London, we steamed round the western and southern coasts of Europe, stopping at Gibraltar and Malta, from whence we proceeded to Brindisi, where we changed vessels and steamed to Alexandria: at the latter place we were forced to exchange the comfort and luxury of an English vessel for the misery and dirt of an Egyptian one, which brought us as far as Beyrout in Syria, from whence, after a short stay, we proceeded in a Russian steamer, if possible even more uncomfortable than the Egyptian one, *viâ* Tripoli, Smyrna, and Constantinople to Odessa; from Odessa the railway conveyed us to Kieff, Moscow, and Petersburg, where again taking to the sea we crossed the Baltic to Stockholm, and travelling across Sweden by rail arrived at Copenhagen; and so, proceeding *viâ* Lübeck to Hamburg, with a deviation to Cologne, arrived again in England (crossing by Antwerp and Harwich), after nearly two months' absence.

Such a rapid coasting voyage, though it is, perhaps, hardly favourable to photography, owing to the necessity for being constantly on the move, yet offers great advantages to the traveller who wishes to see the world. In the first place, the sea voyage is bound to act beneficially on the health, and the course of the vessel enables the voyager to visit both Gibraltar and Malta, places of great interest to Englishmen; further, by staying at Alexandria for a day or two, if steamboat arrangements permit, a glimpse can be obtained of Egyptian life, and possibly a trip made to

Cairo and the Pyramids; so that, in the second place, the above route, though rather a roundabout one to reach Russia by, yet offers to the tourist a series of pictures in panoramic order, and a chain of glimpses into the public life of various nations, which it would be difficult and fatiguing to obtain in any other way. The traveller can visit the vast rock-cut galleries in the fort of Gibraltar, and recall its various sieges and captures; he can meditate in the Church of St. John at Malta on the prowess of her knights and the cruel suppression of their brotherhood; he can study the beneficent effects of British rule in Egypt at the flourishing seaport of Alexandria, or muse over the greatness of Egypt's past amid the indestructible monuments of her ancient history; he can from Beyrout gaze upon the heights of the Lebanon, with their bases girt about in dark green cedar forests, and their upland plains studded with white villages nestling in the hollows, while he rejoices in the words of the Psalmist, "Praise the Lord from the earth, . . . Mountains, and all hills; fruitful trees, and all cedars." At Constantinople he will see from the deck of his vessel, as she lies at anchor in the Golden Horn, the domes and minarets, the crowded houses tier upon tier, the bazaars and the palaces, of the most picturesque city in the world; at Odessa he will be introduced into the new world of Russia, with all its contradiction, its originality, and its naturalism; and as he passes through Kieff, Moscow, and Petersburg he will notice much in the inhabitants and the institutions of this country (which is neither of the East nor of the West) that will help to explain the growing interest of Europe in her commercial and political affinities. At Petersburg he will marvel that the strength of one man's character should have alike created a civilised and ordered nation out of a countless multitude of semi-barbarians, and have turned a vast and unpeopled swamp into a magnificent and populous city, from whence the destinies of four hundred millions of human beings are swayed. At Stockholm he will recall the wars of Charles XII., and that curious turn of fortune's wheel that raised Bernadotte, the groom of Napoleon's stables, to the throne of

Sweden, whilst he cannot but be entranced with the beauties of the situation of this northern capital. At Copenhagen he will revel in the masterpieces of Thorwaldsen, and at Lübeck and Hamburg he will more prosaically dream of the Hanseatic League, of rich burghers, and of the development of commerce and trade from the Middle Ages until the present day; and thus he will return to England with much food for reflection and much material for intellectual assimilation.

The voyage to Alexandria occupies about twelve days, and the time can be passed in great comfort on board a P. and O. liner, provided she is not crowded with passengers, and exclusive of those hours during the day and night which are devoted to coaling. Between Alexandria and Beyrout there are various lines of steamers,—French, Russian, Austrian Lloyd, Italian, and Egyptian; of these the first are the best to travel by, being far cleaner and more comfortable than any of the others, but unfortunately slower; above all avoid the Russian vessels: we chose an Egyptian ship because, as it happened, her time of starting just fitted in with our arrangements, and when I say that the vibration of her engines seemed to shake every bolt and timber in her crazy hulk, and that as I lay in my bunk I could watch the rats chasing each other along the opposite curtain rods, I think I have said enough to show that Egyptian vessels are to be avoided. Jaffa was our only place of call on the way,—the surf there renders almost any

Constantinople from the Golden Horn: Stamboul Side.

vessel unsteady; it is often impossible or dangerous to land, and if the unwary one goes ashore he may find it impracticable to regain his ship. The view of Jaffa from the sea is effective, but the rolling of the vessel renders it almost impossible to get a satisfactory photograph.

Early on the third day after leaving Alexandria we arrived off Beyrout. It was a lovely morning, a thick bank of clouds hung over the Lebanon, above and through which the rising sun was sending his brilliant rays down upon sea and land, lighting up the valleys on the mountain slopes, and the clusters of white houses which form the city, whilst the sea, broken into an undulating surface by the heavy ground-swell, fairly glowed and shimmered under the blaze of light, and the shore boats beating up the spray with oars and prows helped to give the requisite amount of life to a thoroughly charming picture. In landing no difficulty is experienced provided the traveller's passports have been duly viséd by the Turkish consul in London, and a small gratuity disposes of the Custom House without the necessity of opening a single package. The hotels of Beyrout compare most favourably with the houses generally met with in the East,—Constantinople for example,—and I can safely recommend the Bellevue, where the sojourner can be entertained *en pension* for ten francs a day.

Constantinople from the Golden Horn: Galata Side.

Beyrout dates from Phœnician times, and is now the most important commercial port of Syria, though, if the next few years see the construction of the proposed railway from Haifa to Damascus, the days of its prosperity will be soon numbered. The business quarter of the town groups itself naturally round the port, and, owing to the uneven nature of the ground, is composed of many intersecting streets, which lead up-hill in the direction of the old castle, occupying a picturesque position on the higher ground overlooking the sea. Passing through the commercial quarter we find ourselves in the outskirts, with here and there a "khan," through the door of which it is possible to catch a glimpse of thoroughly Eastern life. The large courtyard is surrounded by numerous alcoves for the accommodation of travellers, the central space is occupied by the mules and donkeys munching their scanty allowance of fodder, while everywhere the ground is dotted by little groups of curiously-clad natives,—strange wild people they look, and wonderfully in keeping with their picturesque surroundings, as they spread out the prayer mats for their evening devotions, or prepare coffee for their frugal meal.

The centre of the city is occupied by the bazaars, which will offer much novelty to those who have never visited the still more characteristic ones of Tunis or of Damascus; they are full of quaint picturesqueness; as in all Eastern towns, the various trades congregate together; here we have rows of leather and shoe sellers, there is a street of blacksmiths' shops, further on nothing but provision merchants, while hard by are the sellers of silk goods, for which Beyrout is famous; now and again we come to open spaces, where four or more alleys meet,—here there will usually be a fountain, and the space round it will be filled with women carrying their porous earthenware water-jars, and gossiping as they wait their turn to fill them; here, too, and, in fact, everywhere where there is space to set up his little tripod table, will be the itinerant seller of sweetmeats,—Turkish delight, and other dainties,—while at the next street corner will be a brother-trader with his tray piled up with buns and bread. All the shops are fully open to the public gaze, and the manufacture of everything, from a saucepan to rahat lakoum, can be witnessed by the curious. Camels are frequently met with in the streets, for many of them come in laden with merchandise from Damascus and the Lebanon. They are to be seen tethered in the full blaze of the sun along the blank wall of some side street, sulkily chewing the cud of contemplation, and offering a tempting study to the camera-man. Just above the old castle, and by the side of the high-road, which runs parallel to the coast, is an old Moslem cemetery, with those curious turbaned headstones so familiar to the traveller in countries which profess the creed of Islam; and from the point of ground in this cemetery overlooking the sea a truly admirable view of the Bay of Beyrout is obtained, with the cliffs and white-sailed fishing-boats in the foreground standing out from the sparkling blue of the sea, and the heights of the Lebanon filling up the distance with as grand a background as could be desired.

Beyrout, besides being a good starting-point for a tour in the Holy Land (of which an artistic series of photographs has yet to be produced), is an excellent centre for excursions amongst the villages of the Lebanon, and also to Baalbec and Damascus. The expedition to the latter is well worth making (notwithstanding that it involves a fatiguing drive of seventeen hours) provided the traveller can spare at least three or four days to that most interesting old city; any way, he should take a short drive along the Damascus road as far as the "Pines" during the later hours of the afternoon,—this is the "Rotten Row" of Beyrout, and consequently offers an interesting study. Needless, then, is it to say that Beyrout and its environs afford a wide field to the energetic photographer; but one word of warning is needed,—the light is exceptionally quick, and, notwithstanding the previous experience of the writer in photographing in India and other Eastern countries, he is obliged to confess that, owing to the extraordinary actinic power of the light, a great number of his negatives suffered considerably from over-exposure. The professional photographer, Bonfils, is most ready with assistance and advice, and is willing to put his dark-room at the convenience of amateurs.

On leaving Beyrout our troubles began in real earnest, for we were misguided enough to embark for the ten days' voyage to Odessa on board a vessel belonging to the Russian Steamship Company, called the *Lazareff*. In the first place, anybody except a Russian is *de trop* on board a Russian vessel, consequently we were treated without the least consideration; then the food was very inferior, and our cabin was the worst in the ship, and situated between decks; moreover, it was a three-berth one, and we had to put up with a succession of different cabin companions, changing at every port we stopped at; everything in the cabin, too, was out of repair, and there was no possibility of privacy, since there was no means of locking the door; portions of the ship's stores were kept in the large cupboard in our cabin, so that we were liable, at any minute, to be invaded by the purser's assistants. The number of passengers a Russian steamer will carry is in no way dependent upon the amount of accommodation provided, and consequently in the early morning our cabin was constantly being invaded by dirty Greeks and Levantines, who had been sleeping in their clothes in the passages, and who made use of our cabin as a lavatory; needless to say, there was no such thing as a bath-room, and no deck on which one could sit comfortably owing to the showers of smuts from the funnel; nobody talked any language but Russian except the captain, who knew a few words of English, and there seemed absolutely no sort of discipline kept up,—in fact, the *Lazareff* was nothing better than a cargo and a cattle ship, as was proved by our taking on board 1,200 sheep at Smyrna, bound for Constantinople. True, she was a large vessel, registered as 3,000 tons burden; but the smallest possible portion of her, right aft, was alone devoted to passengers. Our former experience of Russian steamers had been favourable, but our position on the *Lazareff* quite disabused us of the notion that they are comfortable to travel in: it is a lottery in which, from all we hear, the blanks are far more numerous than the prizes, and we, at least, are determined never, on any consideration, to take a passage on board a Russian boat, and can only regret that an otherwise delightful trip was marred by this piece of ill luck, when we might have avoided it by travelling by a French vessel. At any rate, let it serve as a warning to the reader.

Certainly in the voyage itself there were many compensations for the discomfort experienced on board. Stopping first at Tripoli, we saw the highest peaks of the Lebanon, all patterned out in snow, rising above the little white town clustering along the sea-shore, with its uniformity broken by many a lofty palm-tree that rears its crest from amongst the low-roofed buildings; the fishing-boats with their graceful sails slowly creeping out towards the vessel as she lies at anchor in the roadstead offer opportunities for instantaneous photography that should not be let slip. Passing under lee of Patmos, and wending our way amongst many islands, large and small, we stopped next at Smyrna. Here the vessel is moored to the shore, and the photographer finds himself in the best possible position for taking snap-shots from the vantage ground of the ship's deck at the ever-changing scenes that succeed each other along the fine line of quays, where too he will be struck with the curious juxtaposition of busy railways and tramcars with sedately moving trains of camels, bringing in merchandize from the up-country villages. If he cares to face the Customs officials with his photographic kit, he can obtain some capital "bits" in the neighbourhood of the bazaars, where there are many half-ruined mosques and fountains surrounded by groups of picturesquely built native houses; but if he has any ambition in this line he will have to make the best use of his time, and eschew the favourite expedition to Ephesus, since thirty-six hours is the limit of time generally occupied by through-going steamers in lading and unlading at Smyrna.

I must not linger here to describe the voyage through the Hellespont, nor must I be beguiled into telling of the sight of Constantinople, only stopping by the way to remark that if the traveller is comfortably provided for upon his steamer he will do well to stay there, using it as an hotel, since there is no satisfactory inn to be found in the city itself; and moreover from the deck of the ship, as she lies in the Golden Horn, there is ever before the traveller's eye the panorama of the most picturesque city in the world, which the photographer will have ample opportunity of doing justice to if he carefully utilizes the ever-changing foreground of barges, caïques, sailing-boats, and steamers. To Constantinople succeed the beauties of the Bosphorus and the monotony of the Black Sea, and so in due course Odessa will be reached.

Landing in Russia is always attended with many formalities. An army of police and Customs officials board the steamer, and occupy at least an hour in going through the papers of the passengers, before anybody is allowed to land: it is therefore essential to be prepared with a properly viséd passport, and it should not be forgotten that every separate member of a party should be so provided. Russians themselves had told us of the severities of their own Custom House, so we were surprised to find ourselves very leniently treated; indeed, it is probable that in this respect subjects of the Tzar are regarded with more suspicion than foreigners.* With respect to passports, I would mention further that on arrival at any town they have to be given up to the police authorities, only to be returned when they have been duly examined and the tourist has stated his next stopping-place; fees are demanded for the requisite stamping of the documents,—they

ODESSA: THE FORT.

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* I have since heard of a case in which the Customs officials were most troublesome in examining the modest luggage of some English travellers—it was at Riga.

are heaviest at Petersburg, when the traveller is leaving the country.

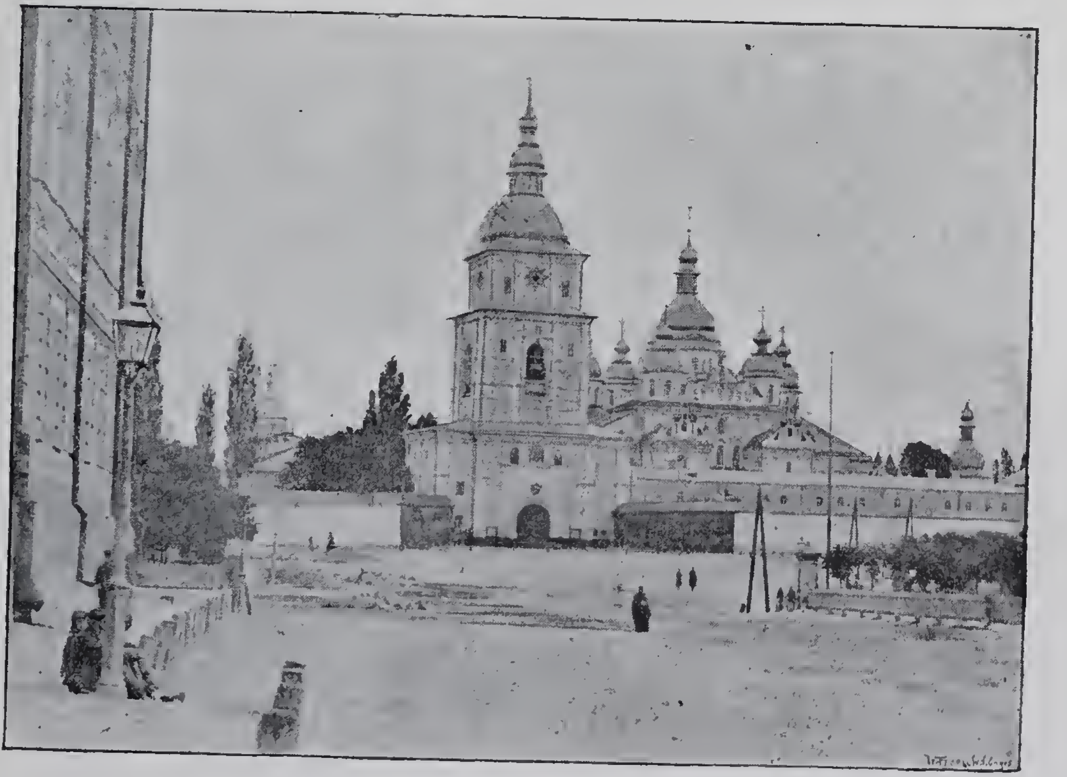
Odessa does not offer much of interest: it is quite a modern commercial city, with broad thoroughfares and spacious squares, promenades and public garden; there is, too, a fine harbour and much shipping. Nearly four hundred miles separates Odessa from Kieff, and fifteen hours are occupied on the journey: the train rolls through a perfectly flat country, with a rich dark soil and constantly recurring vast fields of grain, with an occasional windmill and now and again a forest tract; such is the character of the country from Odessa to Petersburg—one vast uniform plain. Indeed I cannot recall that we passed through a single tunnel in the fourteen hundred miles of railway that we traversed.

Kieff far exceeded my expectations; it is in some respects perhaps a more interesting city than even Moscow itself. Kieff means "the mountain," since it is built partly at the top and partly at the foot of a low range of hills, which run parallel with the Dnieper. What Mecca is to Islam, what Benares is to Hinduism, what Canterbury was to Europe in the time of Chaucer, what Rheims is to the history of the Church in France, what Rome was in the Middle Ages to the Catholic world, so is Kieff to-day to the Orthodox Russian Church. It was the seat of the first Christian church, the first Christian school, and the first library in Russia, and has been the centre from which the civilising influences both of Christianity and of the East have spread over the limitless steppes of the Russian Empire; in a word, it is one of those cities which from their position alone have been designed to be a centre of gravity for history. From the time of the conversion of Vladimir and the great baptism of the Russian people in the waters of the Dnieper, towards the end of the tenth century, Kieff, notwithstanding successive Tartar ravages, internal dissensions, and foreign conquests, has never lost the sanctity which even in later days the churches of Moscow and Petersburg, by reason of their superior wealth and position, have attempted to appropriate.

The city itself consists of three distinct portions, has a population of 200,000, and is strongly fortified, since it is considered the key of the military position in Southern Russia: it occupies two hills, besides the intervening space through which runs the chief street leading down to the river bank, where is situated the third quarter of the city, known as "Podol," devoted entirely to the commercial element. On the northern hill is built the old town, with all the principal churches and public edifices, whilst the other hill is occupied by the celebrated Petchersky Monastery and the fortifications. The rising ground on which the old town stands overhangs the Podol quarter, and from the terrace at its edge the spectator can gaze up and down the broad, sweeping expanse of the Dnieper, and recall the legend which relates how St. Andrew, the Apostle of Scythia, when on his way from Sinope to Rome, passed under the then desolate heights of Kieff, and said, "See you those hills? For on those hills shall hereafter shine forth the grace of God. There shall be a great city, and God shall cause many

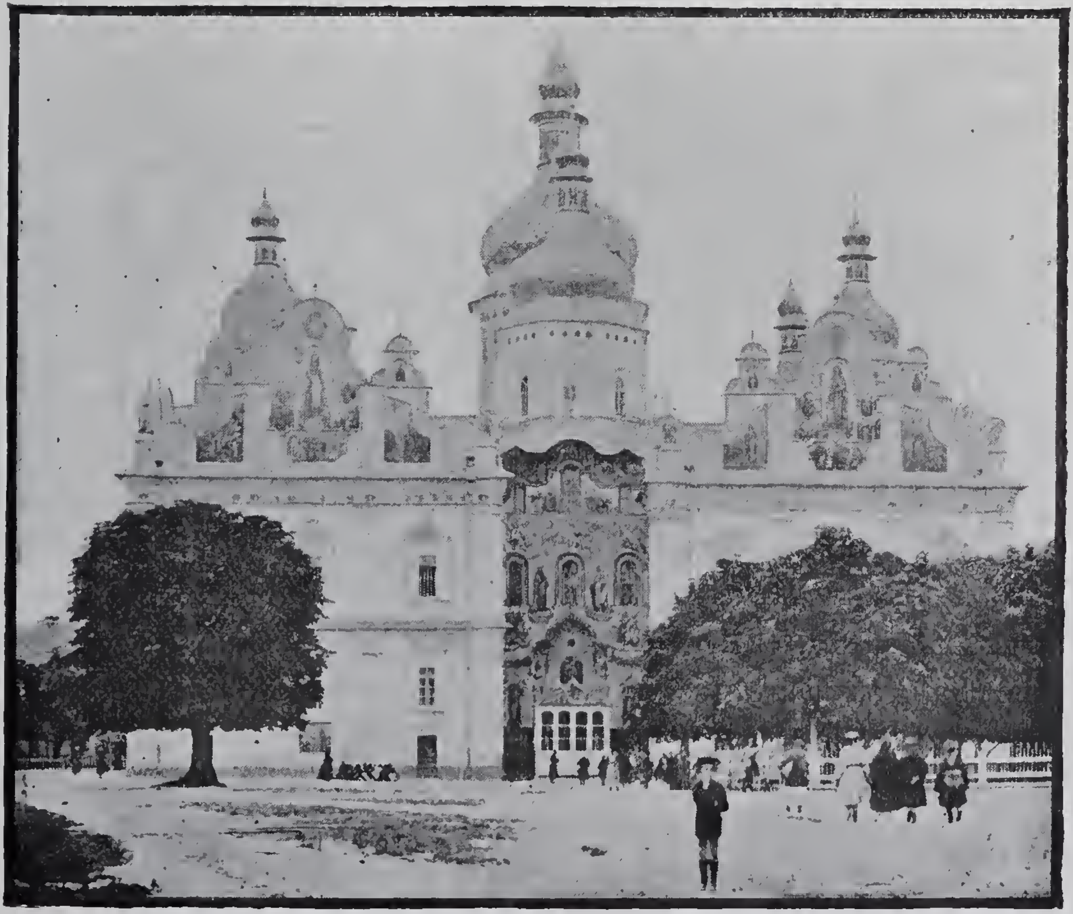
KIEFF: CATHEDRAL OF ST. SOPHIA.

churches to rise within it." This prophecy has been literally fulfilled, and Kieff even now can count upwards of seventy out of the four hundred churches of which the chronicle of the eleventh century boasted; moreover, built actually on the ridge which the saint apostrophised, is a church dedicated to his name, and close by is the statue of St. Vladimir holding an illuminated cross, and occupying the traditional site where in the dark ages of Russian paganism stood the great idol Perun, which the king and saint on his conversion caused to be rolled down the slope and cast into the Dnieper; and underneath the bluffs on which the Petchersky Monastery is built is the river-ford where, as Nestor relates, the people of Kieff were baptized in their hundreds.



KIEFF: CHURCH OF ST. MICHAEL.

The interest of Kieff is certainly mainly ecclesiastical; indeed, the churches are *the* sights of the city. First and foremost is the Cathedral of St. Sophia, presenting a most imposing appearance from the square, one side of which it occupies. A fine gateway with a lofty spire and a handsome gilt dome leads into the cathedral enclosure ; inside and outside this gateway sit, or wander through and back again, numbers of the quaintest and dirtiest pilgrims, all wearing very thick and numerous garments of the same type and colour, most with bare feet and legs, but many with high red boots ; they come from all parts of Russia to visit the shrine of St. Vladimir, the relics of St. Barbara, the piece of the true cross, the Petchersky Monastery, and many other sacred objects and places. Everywhere around the churches are these peasant pilgrims, prostrating themselves, crossing themselves, kissing the sacred pictures, and when the churches are shut or they are tired, squatting down in groups outside the door, waiting till they can renew their devotions. The exterior of the cathedral does not date from earlier than the eighteenth century, though much of the interior, and, in fact, the general design, remains the same as it was when founded by Yaroslav in the eleventh century ; since Kieff has been almost totally destroyed four times between the twelfth and the sixteenth centuries, the only wonder is that any portion of the old building is left. The interior is very badly lighted, and divided up into many sections, so that it is difficult to get an idea of it as a whole ; photography, I think, would be at least unsatisfactory, if not impossible, even provided it were permitted, which I doubt. The decoration is very fine, the portion under the central dome being the most elaborate ; the mosaic work and the frescoes, especially on the pillars, the magnificent iconostasis, with its elaborately worked heavy silver gates, and the general richness of the interior fittings, cannot but be impressive, both on account of their undoubted antiquity and their unique and handsome appearance ; nevertheless, it must be said that the floor of the church is in a very dirty state, owing, no doubt, to the never-ending stream of pilgrims. The Church of St. Michael, conspicuous for its seven gilt domes, repeats the cathedral in most respects ; whilst in the Church of the Dessiatinnaya is the tomb of Vladimir, the founder of Russian Christianity. Following the pilgrims as they go the round of these shrines and relics, we next find ourselves ascending the Liptic Hill, wending our way towards the Petchersky Monastery (or monastery of the Caves), of all holy spots the most frequented in Kieff and in all Russia, three hundred thousand pilgrims annually being the average number that visit the tombs of the saints and martyrs who lie buried in the labyrinth of catacombs that are tunnelled in every direction through the hill. The monastery is contained within a large enclosure entered through a lofty gateway, dedicated to St. Anthony and St. Theodosius, and approached through an avenue of trees along which booths are arranged for the sale of candles and all manner of sacred objects. Inside the gateway is a courtyard occupied on the right and left by the cells of the monks, and in front by the magnificently decorated façade of the principal Church of the Assumption, rich in frescoes and topped with brilliantly



KIEFF: CATHEDRAL OF THE ASSUMPTION.

gilded domes, whilst the treasury of the interior is rich in relic and sacred object of inestimable value. There are eleven other churches within the enclosure, but the chief interest of visitors must necessarily be centred in the catacombs, winding away deep down into the limestone rock, and containing upwards of a hundred bodies of saints and martyrs, among them Nestor, the chronicler and first historian of Russia. Some of these ascetics died from causing themseves to be immured while alive in the walls of the catacombs, leaving only a little window for their heads; one was even buried up to his neck, with his head alone appearing above the level of the floor; all the bodies are exposed to view, but are wrapped up in silk coverings, and each is saluted with a kiss by the devout pilgrim. Besides the tombs, there are many underground chapels in these curious catacombs.

Needless to say, the whole aspect of Kieff is thoroughly Russian: the streets very wide; the houses low and roofed with iron, painted green; the shop fronts decorated with shutters on which are painted in brilliant colours representations of the objects sold within. The roadways swarm with droschkies and peasants in their national costumes, whilst the cupolas of the numerous churches, glittering with their gilt decorations, top the whole.

I have dwelt thus on the sights of Kieff because they are less well known than those of the more frequently visited cities of Moscow and Petersburg, to the first of which I would now conduct the reader across the five hundred miles of plain forming the Governments of Tschernigor, Orel, and Tula; space will not permit me, however, to do more than enumerate the attractions of the old capital of Russia. First, then, there is the thronging, picturesque, outdoor life of the people; the quaint, rambling streets with their gaily-painted shop fronts; the numerous churches and chapels, at whose doors the crowds of pilgrims stop to cross themselves and to pray; the itinerant vendors of kvas or of almanacks, and the Vanity Fair appearance of the Kitai Gorod and the bazaar,—indeed the altogether Eastern aspect of the city. Then, above all, there is the Kremlin, with its battlemented walls, rising from the banks of the river Moskva, and its palaces and treasuries—the magnificence of which it is impossible to imagine. The grouping of the various buildings within the Kremlin enclosure, as viewed from the opposite side of the river, exceeds in effectiveness anything that the writer has ever seen in Europe, and even in India. The Kremlin is the focus of Moscow ; here are the three great churches which, after those of Kieff, appeal most forcibly to the devoutness of pious Russians—the Church of the Archangel Michael, containing the tombs of all the Tzars up to Alexis Michaelovitch ; the Church of the Annunciation, rich in relics, with a jasper and agate pavement, and an iconostasis of gold and silver gilt, housing too the ancient throne of the Tzars ; and, greatest of all, the Cathedral of the Assumption, where the Tzars are crowned, and in the iconostasis of which is a picture of the Blessed Virgin painted by St. Luke, set in precious stones which are valued at £45,000. These three churches are historical and ecclesiastical monuments of the greatest importance : they have weathered all the ups and downs of Muscovite history,—ravages of Tartars, Poles, and Swedes, fire, sword, and pillage ; they have survived the eccentricities of half-mad Grand Dukes, Tzars, and Tzarinas, and the barbarities of the French invaders,—and though no doubt they present to-day a very different appearance both externally and internally from that which they did in the fourteenth and fifteenth centuries, yet they are essentially for all purposes of history and of sentiment the same ; and stand to-day as witnesses to the undeviating faith in their religion, and the unflinching loyalty to their sovereigns, which the Russian masses have for ever manifested, and which still exists in a great measure unimpaired, notwithstanding the evil designs of those who, under the guise of redressing grievances (some of which may be real enough), and under the false name of Liberty, would destroy Church and Throne in order to establish the miserable incompetencies of so-called Free Thought and Popular Government.

Just outside the Holy Gate of the Kremlin stands the Cathedral of St. Basil, built by Ivan the Terrible in the sixteenth century :

it is the most fantastic piece of architecture ever brought to completion. A little beyond the Kremlin, and situated on high ground, stands the new Church of the Redeemer, begun in 1812 to commemorate the retreat of Napoleon's discomfited army: it is far away the most lavishly and magnificently decorated place of worship in the world; lined with precious marbles, mosaic, and frescoes by Russia's most distinguished artists, it has taken nearly eighty years to complete. I cannot linger to tell of the Simonoff and Troitzka monasteries, of the Foundling Hospital, and of the view from Sparrow Hills, from which the exhausted French, after their toilsome journey through the Lithuanian deserts, first descried the domes and palaces of Moscow; but I must hurry the reader over the four hundred miles that separate Moscow from Petersburg, and conduct him to the present capital of the Russian Empire. Here the mind is turned from considering social, religious, and moral questions, as they affect Russians amongst themselves, to contemplate Russia as a political factor in connection with the other nations of the world. Petersburg breathes still the spirit of Peter the Great. The mighty flood of the Neva as it rushes between the massive stone quays, the magnificent stretch of the Nevsky Prospect, the tall spire of the Church of St. Peter and St. Paul, the bristling fortress of Kronstadt, the Picture Galleries and the Museum,—all point to the great Peter, to whose master-mind Russia owes her birth as a nation, and her position to-day in the councils of Europe. True, ecclesiastical buildings of importance are not wanting, St. Isaacs, the Kasan Church, and the Alexander Nevsky Monastery keep up the national connection between Church and Throne; but Petersburg as a city appeals to the imagination as the bold outcome of the original genius of one man, whereas Moscow excites reflection as illustrating the gradual growth of a people's national characteristics.

After the traveller's passport has been properly endorsed by the police officials, he will find many ways open to him for leaving Petersburg: the Wilson line of steamers will convey him direct to Hull, or he can, if he prefers, proceed by land to Berlin, or by sea to Lübeck or Stockholm *viâ* Helsingfors. We chose the latter, since it afforded an opportunity of seeing two more capitals,—Stockholm and Copenhagen,—and it is certainly a route that can be recommended, since the Swedish steamers are comfortable, though perhaps insufficiently provisioned; the only drawback being the probability of fogs and the likelihood of the ship running on a sunken island in the Baltic,—an accident which happened to us, without, however, any more serious consequences than a loss of time. Stockholm is charming, both from its situation and from the general plan of the city, intersected as it is by numerous canals; it would be a capital place for the energetic amateur photographer. As for ourselves, we had so short a time to spare that we accomplished nothing worth mentioning. Arriving at Copenhagen, the traveller strikes the ordinary routes of traffic, and will find no difficulty in reaching the shores of England.

With respect to travelling in Russia, a few hints may perhaps be acceptable to the readers of THE PHOTOGRAPHIC QUARTERLY. The language and the expense are the chief drawbacks. The Russian tongue is most difficult to acquire, even in small quantities, and although the educated classes speak German, French, and English, yet it is not with them that the traveller is thrown so much as with the masses of the people, who are, of course, only able to talk their own language. They are, however, very good-natured, and always ready to give the stranger every assistance. The expense is heavy just at present, owing to the high rate to which the rouble has risen under the existing financial administration in Russia. Rooms at hotels cost 1½ to 2 roubles (3*s.* 9*d.* to 5*s.*), and in some places (*e.g.*, Odessa and Kieff) extra is charged for sheets, pillow cases, etc.; food is proportionately less expensive than lodging; and, speaking generally, it is possible to live for 12*s.* to 15*s.* a day. The hotels at Moscow and Petersburg are excellent,—at the former city the Slavianski Bazaar, and at the latter the Hôtel de France, can be safely recommended. June and the beginning of July are the best summer months during which to travel in Russia; but the seasons and temperature are not to be depended upon, and even in June it is occasionally very cold, and towards the end of July often unbearably hot.

Photography, speaking generally, is absolutely forbidden in the Russian Empire, unless special leave and special papers have been obtained. Not being aware of this fact, I exposed a few plates at Kieff, but fortunately was not detected by the police or the military (which I attribute partially to my being at work very early in the morning); however, when I attempted to take photographs in Moscow, in the neighbourhood of the Simonoff Monastery, I was immediately detected and peremptorily told to desist. I thereupon consulted the British consul on the subject, and he informed me that it takes from one to six months to obtain the necessary leave, and that the penalty for photographing without a permit is confiscation of the apparatus and a safe conduct to the nearest frontier, so that I ought to consider myself lucky in getting off as well as I did. If, therefore, any reader intends going to Russia in order to photograph, he should work through the British consul in order to obtain the requisite papers presenting to that official some sort of certificate of his *bonâ fides* when making his application, which, considering the length of time consumed in completing the transaction, should be lodged a long time before the photographer intends to begin work.

Personally, therefore, the trip, from a photographic point of view, was somewhat of a failure. I travelled with a 10 × 8 camera and a roll-holder loaded with the new Eastman film, which I was using for the first time. To my mind, they are too rapid for general work; it ought to be possible to buy them coated with a slower emulsion. Another word of warning about spools of film, perhaps, will not be out of place; as I have already said, the greater part of our travelling was by sea, and I found the damp affect the film to a distressing extent,—not that I am finding fault with the film, any plate or film would be so affected. In parts of the Levant, off the Asiatic Coast, the Black Sea, and the Baltic, the atmosphere is perfectly saturated with moisture, and if the photographer have a spool *in situ* in his roll-holder, it cannot help being badly injured by the excessive damp; and the fact of it being rolled together seems to cause streaks according to that part of the roll which is most exposed to the damp air. All spare spools should be carried in air-tight tin cases. Although, then, I cannot boast of much photographic success, I can yet lay before the reader some little experience and advice, which, if followed, will at least prevent my recent tour from being entirely barren of results, so far as the subscribers to THE PHOTOGRAPHIC QUARTERLY are concerned.

CYRIL S. COBB.

NOTES.

MANY of our readers who had the opportunity of visiting the Exhibition of the Photographic Society of Great Britain will recognise the frontispiece to this number of the QUARTERLY, "The Love Letter," by Mr. John E. Austin, of Maidstone. On all hands the picture has received commendation. The judges at the exhibition referred to honoured Mr. Austin with a medal, and selected "The Love Letter" from the series exhibited by him for the prize picture.

It may not be out of place to add that Mr. Austin has been awarded prizes for his photographs at practically every exhibition to which he has sent. He has for many years worked at photography. In the selection of his subjects he shows much discretion, in the composition of his pictures a thorough knowledge of art, and in his technical work the utmost carefulness.

Quite the excitement of the last few weeks, in photographic circles, has been the Photographic Exhibition held in the Walker Art Gallery, Liverpool, promoted by the Liverpool Amateur Photographic Association. Over 4,500 photographs are exhibited, many from the Continent, Colonies, and the United States. The attendance at the exhibition has been, up to the time of writing, enormous. Every evening two of the rooms are set apart for an hour for lectures, illustrated by lantern slides. Without exception these "shows" have been great successes. Very considerable excitement was caused when Mr. Paul Lange delivered his lecture on "Iceland." It will be remembered that he and a party of gentlemen, including Dr. J. Reynolds, who has already made known through the pages of the QUARTERLY what was seen and done by the party, visited Iceland. Mr. Lange has reserved his photographs for the Liverpool Exhibition. We understand that they are really wonderful. It is to be hoped that arrangements will be made for Mr. Lange to give his lecture and show his slides in London during the season.

It is quite impossible for us to give any review of the pictures exhibited, but we cannot refrain from calling attention to the work of Mr. Ralph W. Robinson, son of Mr. H. P. Robinson, who exhibits his series of "Artists at Home" photographs. There are no less than sixty-four portraits, which include, we believe, all the R.A.'s and Associates of the Royal Academy. They are uniform in size, 7 × 5 we think, and we are delighted to find that Mr. Robinson has arranged to publish the series in three parts at £3 3*s*. each. The portraits will be in platinotype direct from the negative, and not by process. Such a collection of photographs will in a few years be priceless, and is in itself one of the highest compliments to photography that artists could possibly render.

Another series of much interest are some studies taken with the flashlight by the Countess Loredana de Porto Bonin. No less than twelve pictures are contributed. In the composition and lighting they are certainly marvellous. It is, indeed, difficult to understand how the hard shadows which are usually seen in flashlight photography have been got rid of. Suffice it, however, to say that they are not found in these pictures. When all are good it is difficult to select the best, but for composition we award first place to "Futuro Maestro." In this picture we have a boy who has taken upon himself the duties of the village schoolmaster. His pose is charming, and the boys in his class are most natural. We have never seen such wonderful life in what are evidently composed photographs.

There are in the Exhibition hundreds of good photographs, and the Executive of the Liverpool Society may congratulate themselves upon having the finest exhibition of photographs ever held in the United Kingdom.

Efforts are being made to federate the London and suburban photographic societies. It is thought that such federation will assist the interchange of lectures, exhibition of lantern slides, facilitate the visiting, by rail or otherwise, of places of interest to photographers. Mr. L. M. Biden, President of the Toynbee Hall Camera Club, is the moving spirit. Especially the federation are going to, if formed, put pressure upon the railway companies to allow members to travel at reduced rates when upon photographic excursions. In fact it is hoped that the directors of the leading railway companies will make somewhat the same concessions as they do at the present time to members of the Central Anglers Association.

It has been well known that for a long time past members of the Royal family took a lively interest in photography. Especially is this the case with H.R.H. the Princess of Wales. We think, however, we are right in stating that Her Royal Highness is about the first member of the Royal family who has used her knowledge of photography for any practical purpose. Last autumn, when in Scotland, the Princess took a very considerable number of views in the vicinity of Abergeldie, and has, we understand, given Messrs. J. Mortlock & Son an order to prepare for her a dinner service, upon which reproductions from her negatives will be burnt in. Messrs. Mortlock are so well known for their excellent china that we are looking forward with much pleasure to see this very unique service. There is certainly a very large field open for both ladies and gentlemen to make practical use of the photographs which they take. Not everyone could venture upon so large an order as a dinner service, but many could find enough good and interesting pictures to embellish an afternoon tea service. The *Amateur Photographer* of the 13th ult. gives more concise particulars as to the work of Her Royal Highness.

Since the last number of the QUARTERLY was published, "Photography in Natural Colours" (*vide* the daily press) has been again discovered, this time by M. Lippmann, of Paris, who made known his discovery in a paper read before the Académie des Sciences, of which the following is a translation:—

> "I proposed to obtain on a photographic plate the image of the spectrum in its natural colour, and in such a way that this image should remain henceforth fixed, and be capable of being exposed to full daylight without alteration. I have succeeded in solving the problem by the aid of the sensitive salts, the developers, and the fixing agents now used in photography, by simply modifying the physical conditions of the experiment. The essential conditions for obtaining colours in photography are two:—(1) the continuity of the sensitive film; (2) the presence of a reflecting surface in contact with and behind this film. I mean by continuity the absence of 'grain:' it is necessary that the iodide or bromide of silver, etc., should be distributed on the interior of a sheet of albumen, of gelatine, or of some other transparent and inert substance in a uniform manner and without forming 'grain' which can be seen under a microscope; if there is 'grain' it ought to be of such a size as to be negligable in comparison with the wave length of light. The employment of the coarse emulsions of every-day use is, therefore, excluded. A continuous film is transparent, except, as a rule, for a faint blue opalescence. I have used as a support albumen, collodion, and gelatine; as sensitive salts, iodide and bromide of silver; all these combinations give good results.

The plate, in a dry state, is placed in a frame into which one pours mercury; this mercury forms a reflecting surface in contact with the sensitive film. The exposure, the development, and the fixing are performed as if one wished to obtain a black negative of the spectrum; but the result is different: when the plate is finished and dried, the colours appear. The cliché obtained is negative when looked through; that is to say, each colour is represented by its complementary. When examined by reflected light it is positive, and the original colour is seen, which it is possible to obtain with great brilliancy. To obtain such a positive the image must be developed and sometimes intensified, so that the photograph shall be of a light colour, which is obtained, as is well known, by the use of acid solutions. The plate is fixed with hyposulphite of soda and is then carefully washed. I have found that the colours are then unaffected by the most intense electric light. The theory of the experiment is very simple. The incident light which forms the image in the camera interferes with the light reflected from the mercury. Thus in the interior of the sensitive layer there is formed a system of interference bands, *i.e.* of bright maxima and dark minima. Only the maxima affect the plate, and after the process is terminated, the place of these maxima is marked by deposits of silver more or less reflecting. The sensitive layer is thus divided by these deposits into a series of films, each of which has a thickness equal to the interval which separated two successive maxima—that is to say, half a wave-length of the incident light. These thin films have, therefore, exactly the thickness necessary to reproduce by reflection the colour of the incident light. The colours visible on the plate are thus of the same nature as those of soap bubbles. But they are purer and more brilliant, at least when the photographic process has yielded a good reflecting deposit. This is due to the fact that there is formed in the thickness of the sensitive film a very large number of thin films superposed: there are about two hundred, for instance, if the layer is ·20 millimètre (one five-hundredth of an inch) in thickness. For the same reason the purity of the reflected colour is increased by augmentation in the number of the reflected surfaces. These surfaces form, in fact, a kind of diffraction grating in depth, and for the same reason as in the theory of reflecting diffraction gratings, the purity of the colours increases with the number of elementary mirrors."

The comments of M. Edm. Becquerel are of interest, and were as follows:—

"I wish to explain the difference which exists between the entirely physical procedure that M. Lippmann has explained for reproducing photographically the colours of light, and the photo-chemical process that I discovered in 1848 for obtaining the coloured images of the solar spectrum, as well as the images of objects with their proper colours. It is by the aid of the same chemical substance, the subchloride of silver, formed on the surface of a plate of silver, and of which I have indicated the preparation and modifications so curious under the different influences, notably under the action of heat, that I was able to attain this effect. One ought besides, at the time of the preparation of the sensitive substance, determine with exactitude, as I have done, the thickness of the film necessary for the production of these effects in best possible condition; this thickness may vary between the four-thousandth and the six-hundredth part of a millimètre. These images are absolutely unaltered in the dark, and I possess still the reproductions of the solar spectrum made more than forty years ago; also those images coloured by light which served as basis to Regnault for the preparation of the

> report which was presented to the Academy in 1849. They have not altered by the ulterior action of light, although the sensitive surface upon which they were obtained was not completely transformed, and is still able to be affected by the action of the different coloured rays. It was the same compound on which, still later, in 1865, M. Poitevin used to obtain on paper the coloured images which I produced on metallic plates. When one submitted the photographic images thus coloured to the reducing action of one of the solvents of chloride of silver, such as ammonia or hyposulphite of soda, the coloured shades disappeared, and there where the rays of light had exercised their action, there remained on the surface of the plate of silver a faint trace formed by a thin film of metallic silver, which, whilst it was still damp, showed feeble tints complementary to those which previously existed at the same places. These effects, which it is difficult to reckon *à priori*, show that perhaps the thickness of the films deposited play a part in the production of the phenomena of colour. This matter possesses the curious property, when properly prepared, of not only being sensitive to the action of the different coloured rays, from the red to the violet, in reproducing their peculiar tints, but still of receiving an impression which appears proportional to the intensity of the corresponding luminous impressions on the retina. I recollect, moreover, that this photo-chromatically sensitive substance gives rise, at the moment of the chemical reaction which transforms them to an electro-chemical current, the intensity of which and the electromotive force ought to be proportional to the electro-chemical actinometry which I recognised. This current could perhaps be utilised for comparing very exactly the intensity of the different coloured active rays, for instance of the red and blue rays; when the optical method based upon the impression exercised by the same luminous rays on the retina do not permit one to do this with very great exactitude."

The Editor of *Le Moniteur de la Photographie* says:—

> "We have been permitted to see one of the proofs of M. Lippmann. We have noticed there the image which corresponds to the action of the spectrum on the plate treated as indicated by the learned Professor. The impression, or at least the sensation of the spectral colours, is very pure; certain of the proofs present at the same time a brightness tolerably vivid. We do not know at present anything so far as the practical application to which this discovery may give rise; it has proved at least the possibility of obtaining a photographic proof of the existence of interference. With regard to knowing whether experiments so delicate may serve as the basis for polychromatic reproduction, no one will be able to inform. We find ourselves here in the domain of action infinitely little. M. Lippmann himself has said that a film of one-twentieth of a millimètre thickness should be divided into films, and distinct layers to the number of two hundred at least. The least irregularity in the thickness of the film in its continuity will be able to cause such disturbances of the true colours that they will be reversed. The method itself necessitates a reflective mirror in optical contrast with the sensitive film, the length of the exposure, etc., etc. The inconveniences which multiply in the midst of an operation so delicate force one to consider the communication of M. Lippmann as belonging to the domain of pure science and to wait so that the very long researches may be able to produce results very near a practical application."

It will be gathered from these extracts that the practical application of M. Lippmann's discovery is likely to be exceedingly limited; still it proves conclusively that active minds are at work to solve the securing of an image in natural colours upon the sensitive plate.

A large audience was assembled a few nights since at the Royal Meteorological Society's rooms to hear Mr. W. Clayden's paper on "Meteorological Phenomena," which was made doubly interesting through being illustrated by means of photographic transparencies in the optical lantern. The Assistant Secretary of the society, Mr. William Marriott, will gladly receive photographs of lightning flashes, clouds, etc., to add to the society's collection.

At a recent meeting of the members of the Society of Chemical Industry, Mr. Alex. Watt, F.I.C., F.C.S., described "An Apparatus for the Development of Photographic Plates without the use of a Dark Room."

> "It consists of a metallic case, only slightly larger than the plate for which it is intended, which can be closed light-tight by means of a lid. It is furnished with two tubes, one entering at the bottom of the bath, which can be connected by a piece of india-rubber tubing to the funnel; the other is near the top, just above the level of the plate. The former serves to introduce the developer into the bath, and the latter allows the air to escape and also acts as an overflow.
>
> "The funnel and the india-rubber tube are supported by means of hooks, which fit into an eye. The tubes are so bent that no light can enter the bath.
>
> "When the bath is intended for the development of films or paper prints it is furnished with a carrier, into which the film or paper is inserted before being put into the bath, and when required for the development of several plates at one time it is constructed with grooves, as in an ordinary plate box.
>
> "The bath is used as follows: the dark slide containing the exposed plate and the bath are placed in a changing bag, into which it is only necessary to insert the hands. The plate is then transferred from the slide to the bath, care being taken to keep the film side towards the back of the bath.
>
> "After being closed, the bath is withdrawn from the bag into daylight, and fixed vertically to any convenient support by means of the hook. A vessel is placed under the overflow tube, and the inlet tube is attached to the funnel, which, after being filled with the developing solution, is raised and lowered several times, to alternately fill and empty the bath, and so ensure the removal of air-bells from the surface of the plate. After standing sufficient time to complete the development the solution is run off from the bath. The plate is washed by running water through the bath (either by means of the funnel or by attaching the india-rubber tube direct to a water tap), after which it is taken out, in daylight, and 'fixed' in a covered tray.
>
> "If it be desired to 'fix' entirely in the dark, the operation may be conducted in the same bath, or in a similar one to which the plate has been transferred in the changing bag.
>
> "The final washing of plate may be done either in the bath or in the usual way.
>
> "A developing bath constructed as above, besides enabling plates to be developed *without a dark room*, has some other advantages over the ordinary developing tray. The bath, being used vertically, presents a very small surface of liquid to the air, thereby preventing the rapid oxidation of the developer. As the solution is introduced at the bottom, under pressure, it flows up evenly over the plate, carrying the air before it, and so prevents air-bells. The plate is completely immersed in the

solution during development. The bath being quite light-tight, there is no risk of 'fog' from access of light to the plate, and it is therefore especially suitable for the development of isochromatic and other very sensitive plates. The tubes attached enable the solution to be readily run off and replaced by one of altered composition, and also allow of a continuous flow of developer through it.

"As this apparatus has been designed for the development of correctly exposed plates, any plates developed in it which are either over- or under-exposed will be more or less defective. If, however, the exposure has been nearly correct a passable negative will be obtained; but if it has been *widely different* from the correct one, as no provision is made for remedying the defect, the negative will be a failure; but if such a result should lead to more attention being paid to the exposure, it will not be altogether to be regretted."

We have had no opportunity of testing the apparatus, but the negatives and prints shown at the meeting would seem to leave nothing to be desired.

Judging from the number of hand cameras now in the market, it would, seem that there must be an enormous call for them. Every day some new form is brought to us for inspection, each one having some novel application adjustment, or feature. It is quite certain that every touring photographer should be provided with a hand camera of the magazine form, or fitted with a roll holder; not that he should leave his larger camera at home. It is in our opinion impossible to compose a picture with a hand camera as ordinarily used; but they have become necessary, and as a handmaid are admirable. We are afraid there are those who now leave their cameras with dark slides and tripod at home oftentimes return home sadly disappointed with their photographic bag. The use of the hand camera does not advance the art side of photography. A good photograph is like a good picture, it requires much care in selection, lighting, and composition; none of these points are sufficiently considered when using the hand camera. There are many opportunities of securing reminiscences of a tour with a hand camera that it would be quite impossible to obtain with an ordinary camera; still, to those travelling abroad and on the Continent, we would urge the desirability of taking both. With the camera a good worker may be quite certain that he will bring home valuable negatives; but with the hand camera the percentage of good negatives is well known to be small, even with those who know how best to use the hand camera.

There seems to be every reason to expect that there will be a rise in the price of ¼-plates. At one shilling a dozen they are out of all proportion to the price charged for ½-plate and other sizes. We believe it to be a fact that the shilling a dozen ¼-plates have always been made and sold at a loss. They have done much to make "starters" in photography, but very few we are afraid ever reach the winning-post.

At the meeting of the Society of Arts, held on the 9th ult., Professor Medola delivered the first of his series of lectures upon Photographic Chemistry. In the second lecture, given on the 13th, he introduced Mr. Frederick Varley, who, in conjunction with Mr. Friese Greene, has discovered a new rapid sensitive salt free from silver. Mr. Varley exhibited a piece of paper, with a good portrait in black and white on both sides of it, to show that although the salt used was very sensitive, both sides of a sheet of paper could be printed upon, each exposure not being sufficiently long to set up fogging action through the paper. He next exposed a piece of sensitised paper under a negative to weak gaslight for about half a second, developed it with ferrous oxalate, washed it, and exhibited it unfixed to the chairman and others present. He said that he would not detain them while he fixed it, but that the unfixed image would go on slowly darkening. How far the salt can be profitably used in everyday practice remains to be shown.

At the Paris Morgue photography is very extensively used; everybody that is brought in is photographed; large photographs are specially taken of the hands, and any marks, scars, or bruises. It has been found that these photographs have rendered signal service in assisting identification.

We understand that in America considerable dissatisfaction has been expressed by "wheelmen" (cyclists) as to the condition of the public roads, with the result that a number of experienced photographers are undertaking a road survey. The photographs will be submitted to the proper authority, and cannot fail to be silent witnesses as to the need of improved roads.

It is said that the celluloid film is to be used for lantern transparencies. If such films will stand the heat much vexation and expense through the breakage of slides will be saved; but we should rather fear that with the very considerable magnification necessary in projecting pictures with the optical lantern, that the strata or grain of the film will show strongly on the screen.

Mr. L. Warnerke recently gave a very interesting demonstration before the members of the Photographic Society of Great Britain on a "Simplified Collotype Process." For the purposes of explaining the process, he took a sheet of vegetable parchment coated with gelatine, and showed how by immersing for three minutes in a 3 per cent. solution of bichromate of potash, to which a little ammonia had been added, the film was sensitised. It was then squeegeed on to glass that had been previously rubbed with talc, and stood in an ordinary warm room to dry. If sensitised over night, it would be dry and ready to use in the morning. It could then be peeled from the glass, and was ready to expose behind the negative. The exposure was carried on until the details in the more opaque parts of the negative were visible. The film was next exposed with the back to the light—to diffused light—for a period which might average five minutes. The effect of this exposure was, first, to harden the gelatine next to the parchment, and so to prevent the film from being torn off in the press; and, secondly, to lessen the relief of the gelatine surface. The film was then placed in water for about two hours to remove the bichromate, and afterwards immersed for an hour in a mixture of glycerine, seventy parts; water, thirty parts; ammonia, three parts. After this the film was stretched upon a wooden frame and rolled up with ink. The ink should be of two degrees of stiffness; the first, or thick ink, adhered only to the deepest shadows, and the next, or thinner ink, was used to render the half-tones. By adjusting the character of the inks various results could be obtained as desired, and differences of the negatives allowed for. A film which had been exposed under a negative of a trying subject—a marble figure with a background of dark foliage—was inked and printed from, and it was explained that the first print pulled was always defective and had to be rejected. After half a dozen pulls or so the plate would get into working order. The use of the process for various purposes—printing on canvas, on woodblocks, and on transfer paper for transfer to porcelain for burning in—was illustrated by examples of the various methods. For ordinary work a reversed negative had to be made.

We understand that the work of the "Lantern Mission," to which we referred in the January number of the QUARTERLY, progresses, and the scheme is receiving considerable support. The following from Mr. Stead's new journal, *Help*, upon "The Churches and the Lantern," is interesting. A writer says:—

> "There lies within the reach of the Christian community an agency by which, with a little co-operation, and at a comparatively small expense,

thousands upon thousands of those outside the pale can be reached. I refer to what I have called the Magic Lantern Mission. If in Luton, a town of 30,000 population, it is possible to fill a hall all the winter through with a congregation of a thousand to fourteen hundred persons, not one of whom would attend another place of worship, and every one of whom was willing to pay a penny in order to attend the magic lantern service in a public hall, then assuredly we have here a means which needs but to be intelligently used in order to open up a great field for Christian action from which all Christian workers seem to have been debarred. Now, why could not the Churches, or groups of the Churches, meet together to conduct a magic lantern mission? The magic lantern is not denominational. It can, of course, be pressed into the service of sectarianism, but, taking it as it stands, whatever picture teaching can at present be provided for those who wish to use the lantern is catholic in the widest sense. What I should like to see would be that in every town, or in any section of a town, that is large enough to be considered as a unit, the various Churches should agree to establish a magic lantern mission on Sunday evenings for the purpose of reaching those classes which at present they do not reach, and also to establish, in the largest school building which they can secure, a joint lantern service for the Sunday school scholars, who on Sunday evenings are left to do as they please, and go where they please, without any attempt whatever to gather them together for instruction and for edification."

"General" Booth's book, "In Darkest England," has had an enormous sale; and we have just been told that Messrs. Tearle & Anderson, of Luton, have in hand the preparation of a set of slides to illustrate the book, which will be issued under the title "Darkest England Illuminated."

The Camera Club may be said to be in working order now. The first Thursday evening meeting in the new Club-house was held on the 19th ult., when the Rev. T. Perkins, M.A., read a paper, "Further Notes on Church Architecture," illustrated by lantern slides. It will be interesting to note here that at the Club they have no lantern screen. The pictures are projected on to the wall over the mantelpiece at the end of the large room. This wall has been specially rendered in cement, coloured, and flatted down. As a consequence the whole of the light is reflected from the room and none absorbed. A nine-foot disc can be shown, which, in our opinion, and evidently that of the Lantern Committee, is amply large enough for all purposes. The Club-house is most complete. A very careful description was published in the *Amateur Photographer* of the 9th and 16th of January. We feel sure, however, that upon presentation of a visiting card the Committee will gladly permit any one interested in photography to inspect the house. Not only are the photographic requirements perfect, but the social side of the Club will hold its own with any club of the size in London. The Committee have carried out their work admirably, and it seems astonishing that out of so small an affair started five years ago such an excellent club should have been built up. The Annual Conference will be held this month, commencing on Tuesday, the 7th inst. Papers are to be read in the Theatre of the Society of Arts on that day, and on Wednesday from 2 to 5.30 p.m. In the evening of the first day an exhibition of lantern slides will be given at the Society of Arts, and on the second day the members and friends will dine together. There will be an exhibition of photographs and photographic apparatus at the Club during the Conference week. Papers will be read by Captain Abney, Sir H. Trueman Wood, Mr. Joseph Pennell, Mr. C. V. Boys, Major J. F. Nott, and Mr. Lyonel Clark. We might note that all interested in photography are invited to attend the meetings at the Society of Arts.

The Lantern Society is doing good work under the able direction of Commander C. E. Gladstone, R.N. Many interesting papers have been read, and of course a very special feature is made in the use of lantern transparencies to illustrate the same.

A very amusing application of photography has been tried in America. A story was written for a magazine, the *Cosmopolitan*, and we believe the MS. was handed to a photographer instead of an artist, in order that he might compose pictures to illustrate the story. In this case we fear the photographer was not an artist, and he certainly did not succeed in getting the "hang" of the story. The illustrations are ludicrous in their inappropriateness. Mr. Charles E. Pearce, a clever writer, has pointed out the idiosyncrasies of the photographer in a most amusing article, published in the *Amateur Photographer* for the 13th ult., entitled "The Illustrated Novel of the Future." He finishes his article by saying:—

> "The union of the photographer and novelist may be a very desirable thing, but, at least, the two ought to make up their minds to agree upon all important points. Most readers are indulgent, still they may be irritated beyond endurance; and when they are perpetually getting 'mixed' between text and pictures, the book, by a 'vicious kick,' may find its fate in the fire."

We have always hoped to see a revival of that beautiful section of photography, stereoscopic work, and are pleased to find that certainly in Lancashire and Yorkshire great advances are being made. A Stereoscopic Club has recently been formed at Sale, and that very enthusiastic "stereoscopist," Mr. I. W. Chadwick, has consented to act as Hon. Secretary. He is one of the most energetic of workers, and, we feel sure, will do all in his power to advance the production of stereoscopic pictures.

The Duke of Newcastle has lent his name and influence to the promotion of a photographic club for old Etonians. Mr. Gambier Bolton is working with his Grace, and we should think that there will be but little difficulty in obtaining support for the movement.

The Crystal Palace Photographic Exhibition opens on the 13th inst. We understand that there will be a very considerable show of photographs, and that excellent arrangements have been made for lantern evenings.

In connection with photographic literature there has been for many years "Annuals," and we understand that they have always received considerable support from workers in photography. It was not to be expected that the amateur would long be kept without his special "Annual." Such a book was published a few weeks since, under the title, "The Amateur Photographer's Annual."* The sale, we understand, has already been enormous. It is issued at the popular price of one shilling, and, quoting from the title-page, we note that it contains "articles, questions, and answers upon photographic manipulation and procedure, together with many practical suggestions and hints not to be found in any other book on photography." The arrangement of the letterpress is in the order of photographic procedure. The book is very fitly described by the *Photographic Art Journal* as "a veritable 'Enquire Within upon Everything.' A vast amount of information is clearly conveyed in the simple form of question and answer. The answers are by experts, and therefore reliable; and, judging from a cursory view, the questions and answers given would seem to cover the whole field of practical photography."

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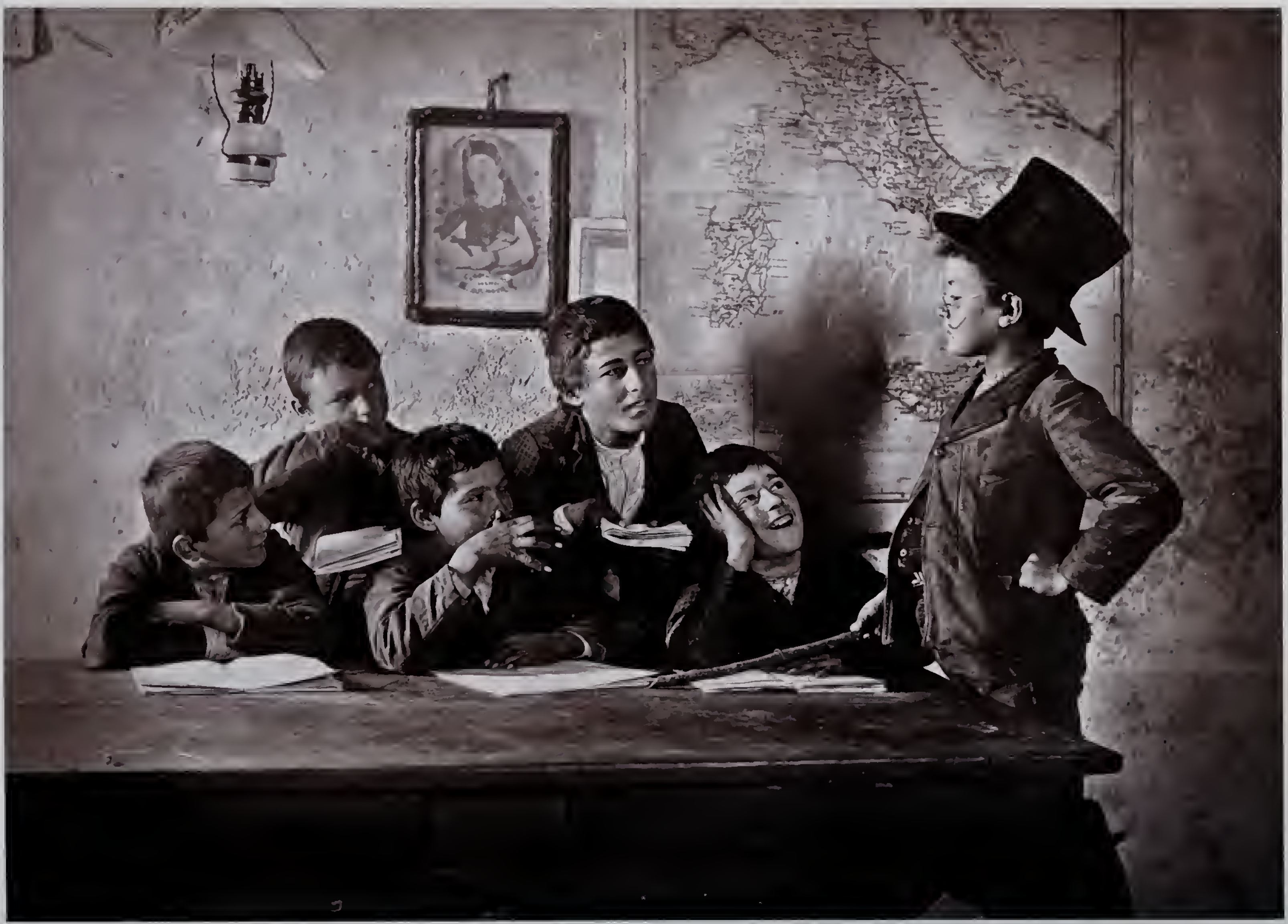
* London: Hazell, Watson, & Viney, Ld., 1, Creed Lane. 1*s.*; cloth, 1*s.* 6*d.*



Woodbury Co.] [Countess Loredana de Porto Bonin.

"THE FUTURE MASTER."

(GOLD MEDAL, LIVERPOOL PHOTOGRAPHIC EXHIBITION.)

THE

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SHALL WE RENOUNCE?

NO excuse, I think, is needed for continued reference to the experiments and conclusions just now prominently associated with the names of Messrs. Hurter & Driffield. Such theories and demonstrations are of interest to the ordinary practitioner, as well as to the scientific investigator. At the same time, the claim that these discoveries should radically affect the position and actual practice of those devoted to artistic photography will by the majority be held to be at least open to argument. Those who feel that the camera, lens, plate, and processes are by the artist best known only practically, and those who think that all and any means justify the ends obtained, will not be moved by the results of fresh photo-chemical investigations—at least, not until long after the theories have blossomed into an alteration in common practice, or into a handy and popular piece of apparatus. And there is much to be said for that point of view. On the other hand, there are many who have no horror of fresh scientific appliances or calculations in moderation, and who feel that some science is essential to the complete education of the would-be photographic artist, and these will want to explore fully the capacity and advantages of every newly proposed procedure that is based upon some reasonable foundation. For myself, I think I should reap greater satisfaction from a method the aim of which was to ensure throughout scientifically the true seizing of the facts which go to make up our impressions of nature, than from a system any part of which was haphazard, and which left the results to be selected and doctored at the end. Almost any method affords scope for artistic treatment and expression, but it is certainly better to feel full control over our processes than to be the sport of their seemingly unregulated humours. As one interested chiefly in the artistic bearings of the question, I must, however, admit that I arrive, on the whole, at much the same conclusion as Mr. H. P. Robinson. But I cannot take it quite so gaily as he has done, and may, in the course of my remarks, be unwise enough to urge some reasons for differing from Messrs. Hurter & Driffield purely on some of the art aspects of their case. I hardly think these gentlemen are justified in feeling sore or in making bitter complaint that they have so far "laboured under a cloud of contempt." Surely they are over-expectant if they have hoped to remove all prejudices at a blow. It seems rather that they ought to be thoroughly satisfied with the interest, the inquiry which they have stirred up; and, indeed, with the recognition they have received. Some of the opposition which has troubled them may possibly have been caused by their somewhat arbitrary statement of claims, and a summary way of treating a well-established view—or prejudice, if you will.

First of all, the conclusions drawn from experiments with the light of a standard candle may not altogether hold in dealing with the scale of light in natural subjects and in dealing with colours. The scale of nature is greatly outside the possibilities of the painter or the photographer. If the whole work is to be done scientifically, variations might have to be made in the negative and print to suit the particular light in which the picture is to be viewed and its values measured. The work of the painter and of the photographer artist is a compromise. The picture and its parts are not viewed in the same light as that which fell upon the various planes of the landscape, nor is either picture or scene illuminated by the light of a standard candle. We want and welcome from scientific discoverers every aid to increasing the power of our plates and printing methods in registering more correctly and fully light and colour relations, but the scientist and the artist will possibly look at these things in a different manner. It might have been better had Messrs. Hurter & Driffield confined themselves to their admirable demonstrations of fact in a purely scientific way. To have added any dictum as to where the artist's feeling and functions came to an end was apparently travelling outside their experience, and struck most readers as a weakness. The influence of their work, if valuable, must no doubt filter through and be felt by every artist; but hardly any reason seems to have been added, beyond what existed before, for any renunciations, or for limiting the special functions of the artist at the making of the exposure. The practical photographer has to take the negative only as a means to an end. It is the print that must be in his mind. There is little use in having a scale of gradation in the negative, exactly corresponding to that of the scene, if there be finally no printing process to answer thereto. When scientific control over the relations of the negative is made a mechanical certainty, there will still remain the same work to be done with the printing process, or else the photographer must continue to work back, and suit his negative to the qualities or deficiencies of his printing medium. No standard developer or mechanical method will do this. There is, no doubt, a great deal of delightful uncertainty about photographic processes, as there is about etching. It is the artist photographer's special business and education to learn to correct deficiencies at every step, and even to take advantage of any opportunities that occur outside his original intention. The photographer has *not* done all he can when he has selected and focussed his view, or else Messrs. Hurter & Driffield have their own special and peculiar idea of what is permissible and legitimate to an artist and what is not. The artist has to learn to see and know what he wants throughout the course of his processes, and not merely at the outset. He has to master his technique with a view to artistic effect, similarly as a painter acquires his methods of handling, his science of colour and of appearances. He has—and this is no small matter—to see and know the best possibilities of a negative when he has got it, as well as the best treatment in printing. It is not impossible that a negative which Messrs. Hurter & Driffield would cast away I might prize and nurse for some reason, and they might feel able to prove themselves mathematically right, whilst artists might commend the print I should ultimately turn out.

Leaving development out of the question for the moment, there is plenty of room for individuality in photographic *printing*. Take platinotype printing, for instance, those who discriminate know that they often obtain from a negative just one print which gives them what they want—just the effect, the sentiment, the tone that pleases. There is no reducing it to rule or standards. It is done, it is felt, and the result is recognised. Not infrequently the difference between one platinotype print and another from the same negative is—whether by treatment or by happy chance—the difference between what is commonplace and what is poetic, and it can be seen that some sentiment may be lost or gained even in the printing process. It will have happened to most photographers to find that *one* picture is obtained from a certain negative and seldom another. A perfect success is rarely repeated. Indeed, it would be interesting to see a class of photographers producing such selected pictures of a large size, breaking each negative as the required print was obtained, and keeping together and prizing their collection. But this by the way. To say that the artist photographer's power ceases at exposure is to argue innocence of the qualities, variations, and treatments possible in printing. If a photographer prepare his own printing paper—platinotype or silver—variations in the values and qualities of the prints are at once possible. Even in development of platinotype prints there would appear to be some power in regard to varying the relative values of the picture. And last, but greatest of all, it is strange to overlook the individuality and artistic knowledge and feeling shown in cloud selection and printing, sunning down, and in all the purely photographic treatments which are possible and proved legitimate by their success.

Turning to the matter of exposure and development, even if we accept as proved all that Messrs. Hurter & Driffield claim for their theory, it will, I think, be seen that the ordinary methods of the photographic practitioner and artist will be hardly at all affected by their photo-chemical investigations. For after all their emphasis upon the absolute necessity for correct exposure, and the advisability of using the actinograph, they come round to admit that with a good sensitive plate there is considerable latitude of over-exposure, and that it is in respect to the extent to which development shall be carried that the judgment of the operator must be exercised. Now it seems to me this is exactly what every sensible photographer has always been in the habit of acting upon. He selects richly coated plates, takes care to be on the right side of a full exposure, and then develops until the extremes of density are such as promise a reasonably correct range for the particular printing process he uses. Messrs. Hurter & Driffield admit the latitude given with thick plates. The question may be raised whether in specifying as a limit "twice" what they measure as "correct exposure" they have gone far enough. Writing merely from practical experience and casual observation, I should have said that the difference as regards values could only with very great difficulty be distinguished in prints taken from landscape negatives whose exposures differed as much as four times. This, of course, provided the development were suited to each case. And the same with some transparencies for the lantern.

No doubt an idea of the possibility of a general alteration in the gradation and relations of negatives by variations in the constituents of the developer has been, and still is, in the minds of photographic operators; but although such an idea is rife, yet, at the same time, very little actual consideration as to altering the relative values of the intermediate tones of the negatives has ever troubled any photographer, his attention being devoted to a keen watching of the growth of general density and of the extremes of contrast in the plate. This Messrs. Hurter & Driffield doubtless perceived, but they hardly seem to have given the fact its proper weight in claiming to have upset the theory and practice of the great body of photographers.

We have had it shown that control is possible in development by variation of the time for which development is continued. Such a procedure, it is said, does not alter the relationship of the densities to each other; it only varies the distance apart of the extreme densities. But, leaving out of consideration the cases of negatives with what is called clear glass in them, by such a change in the extremes we may actually alter many of the values of the print taken from that negative, and it is the print which is of final importance to the photographer. These extremes being got right (and remembering the latitude allowed with thick plates this ought not to be infrequent up to the point of accuracy possible to photography), then the photographer need not greatly trouble himself that the intermediate relations are not altered or rectified. With a full exposure and the extremes of density printably correct (so often an impossibility in photography), the relative values will not be noticeably worse than those produced by an artist painting in monochrome. The matter of greatest importance is that it is not so much any correcting of our present system of exposure and development that is wanted, but an actual enlargement of our powers in respect of recording range of light and the correct relative intensities of colour.

It will be said that the aim is to ensure truth of tone in photographic results. But the old question recurs with special force, What is truth? What truth is meant? Is it actual measurable scientific accuracy in minutiæ that is intended? Messrs. Hurter & Driffield are nothing if not scientific; but how do they propose to measure and secure the range of light in the great majority of landscape subjects? It is well enough to experiment in search of scientific principles with a standard candle and monochrome tints, but when it comes to dictating what is truth, in rendering nature pictorially—the truest truth to the artist—the case is somewhat altered! Upon what principle is the rendering into black and white to be based? Thus a print may have the same number of tones and the same interval between its gradations as a given subject, and yet not, in the opinion of some artists, give the effect of light in the scene. It might be that none of the tones were *absolutely* correct as seen in *any* light. The key might be wrong. Thus an artist may take the deepest black and the lightest white he can, as representing the darkest shade and the highest light respectively in a scene, and so secure the greatest number of possible steps between. Or he may paint his picture to be seen in a certain light with the shadows and half-tones to show of the same *actual* depth as those in nature appeared to him to be, doing the best possible with the high-lights. Are, then, the prints from Messrs. Hurter & Driffield's correctly exposed negative (supposing them to answer tone for tone to the values of that negative, which of course the prints do *not*)—are the prints to be examined out of doors in the same light as that which shone upon the view, or are allowances to be made in the exposure or in applying and heating the standard developer in order to get things scientifically correct?

The probability is that photographers who think they are artists will still have to go on selecting from the beginning to the end of their work in subject, lighting, arrangement, printing paper, cloud printing, sunning down, shading and otherwise treating their pictures photographically, and so, from beginning to end, marking their productions with something of their individuality. Still, although such workers may doubt the correctness of some of Messrs. Hurter & Driffield's conclusions, and consider they pass out of their proper field in touching the art question, I take it we shall all be thankful to those investigators who add any greater certainty and power to our processes, and we shall not hesitate to adopt any instrument or means which the skill and research of the scientist may make available.

There is one other matter regarding development which seems to be of interest. Messrs. Hurter & Driffield admit that the density ratios of negatives may be altered by the use of developers the energy of which depends upon the presence of alkalies, and especially of ammonia; but they contend that this action is quite irregular and beyond control. But I suppose this action also takes place "under fixed laws." Perhaps if they investigated this matter with the same thoroughness and persistency that they have devoted towards establishing their theory, it might be found that after all some certainty and control *could* be demonstrated. Speaking again merely from practice, it seems to be so far a matter of control that it is possible with specific plates to know when the actions referred to may be expected to operate, and it has seemed to me that those characteristics of the pyro-ammonia developer have been very useful for some purposes.

In conclusion, Messrs. Hurter & Driffield will say that it is useless to try to teach photographers who accept a bit of science at one moment and take refuge in the obscurities of the sentiment and dodges of the artist at another; and they would be quite right, for in their noble field of work the statement and proof of scientific fact is all that is required of them. It is only when they leave their proper field that they tempt the publication of unscientific doubts such as I have ventured to put forward. No doubt there is a basis of science for everything, even for what are generally regarded as the intuitive perceptions of the artist or the poet, which govern his actions throughout; but to lay all this bare and to classify it is an intricate path to travel, a superhuman task at the present time, and it remains for Dr. Emerson to give the world ten or twelve years hence the promised philosophy of art which shall be universally accepted!

There is much to thank Messrs. Hurter & Driffield for. They will have helped on the use of thickly and richly coated plates, and have drawn wide attention again to the importance of carrying development to the right point, and, if nothing more, have added to our hopes that, with the acquisition of greater powers in photographic methods, we may in time attain to certainty in seizing what we see and admire.

G. Davison.

WHAT TO PHOTOGRAPH?

TO the amateur who has just bought his first camera, and first dozen of plates, this will doubtless appear a very stupid question. He has probably already been out taking pictures with a friend, and tasted the sweets of wandering by the river's side, or in the rural lanes; more intent on seeing that river with its bending rushes focussed sharply upside down in his friend's camera, or the equally reversed bit of lane where the branches of the trees cross and re-cross in a bewilderment of detail, than whether the friend was taking anything that was really worth photographing. Possibly the innocent amateur even thought that the bright little gem of landscape would surely be reproduced with all its charm and vitality in the photograph which had delighted him so much in the glimpse under the dark cloth. Ah me! what delusive hopes are raised with that dark cloth, and to what dead aspirations it is a fitting pall! But the bitter lesson is soon learnt, however, and often with the expenditure of the first dozen of plates the amateur is a sadder, if not a wiser, man, and is perhaps willing to allow there is more in the poet's lines than ever he allowed before—

"When young life's journey I began,
  The glittering prospect charmed mine eyes,
I saw along th' extended plain
  Joy after joy successive rise.
But soon I found 'twas all a dream,
  And learned the fond pursuit to shun
Where few can reach their purposed aim,
  And thousands daily are undone"—

and agrees that this applies as forcibly to photography as it does to life. We will presume, however, that the "fond pursuit" in the case of our amateur is not going to be shunned, but the more earnestly followed, and he will then cease to smile at the heading of this paper, or the smile may be converted into wonder that the title was not rather " What not to photograph ? " but it will readily occur to him that no quarterly paper would have been large enough for the list, to say nothing of comments and reasons. If this should sound all very pessimistic, as I fear it may, it must be remembered the discouragement is more apparent than real; and like many another forcible negative we can get a very excellent positive from it if we will; indeed, the very fact that there are so many things not worth photographing implies that there must be some that are very well worth it. This is very strongly brought home to one in sauntering through an exhibition.

It was my good, or ill fortune to be a judge at an important exhibition of photographs recently. How hard I and my brother judges worked at that exhibition; how dog-tired we were before we had come to our decisions; and what a tremendous task we found we had undertaken to conscientiously do justice, and this because the work was, all round, so excellent. The rubbish gives one no trouble at all. You don't need to look at it twice; it is not always because the pictures are badly taken, some are excellently well taken—irreproachable as technical work; but the more unpardonable because they ought never to have been taken at all—had no *raison d'être*—scenes that, had a painter been dealing with, he must of necessity have knocked out 25 per cent. of the subject, and three-fifths of the detail, and then, if artistic, they would not have been interesting. This is a dreadfully hard thing for the photographer to learn—the very last thing he does learn, even when he sets to work to make a composition in his own studio that shall be pleasing, and that after years of practice too. The temptation to put in accessories that are not wanted, but distract the eye from the simple straightforward story, is, except in rare instances, irresistible. How much more difficult when Nature has built up what you are pleased to call a picture, but which has in it often the material for a dozen. Here the amateur may feel inclined to stormily say what nonsense this is! If I am to photograph anything at all I must take it as I find it. Pardon me, dear sir; if the picture you elect to take be of the kind I have mentioned you are admonished to let it alone. Nothing will ever come of it but mortification, for while it has been truly said that "a thing of beauty is a joy for ever" the reverse is equally exact, and the thing you perpetrate that is not beautiful will cling to you as a roosting and abiding curse; and, unless you are very eclectic when out photographing, remorse is sure to follow.

It will be asked, How can one be eclectic with the camera? Generally, I answer on very easy terms, especially in this country; but we have not come to that yet. First, it is necessary to know what this eclecticism is. Many excellent photographers have thought that they felt it, or have conscientiously striven for it, taking strange means to get it; often, oddly enough, after having got it without knowing it, and not being satisfied with it, have striven for something else which they thought was it, but was not it at all, but a mirage of rough paper or pinhole. But if this mysterious something, that converts nature into art, is not ready to hand in the field, where is it? It is ready to hand if you can find it; it is all around you, and as obvious when you have found it out as the stupid puzzles the grocer wraps his pound of tea in; but to find it out you must take a few hours, when you can spare the time, at the National Gallery; you must get some good work on pictorial composition, such as Harding, and study it pretty deeply, especially those portions I dwelt upon in a recent lecture given before the London and Provincial Photographic Association, and which are full of value and useful hints to the photographer as well as to the painter. It should also be borne in mind that nature is not art; this is constantly being said, but as often forgotten. The Royal Academy enforces it this year by the admirable quotation from Balzac, printed on the catalogue of the exhibition: "*La mission de l'art n'est pas de copier la nature mais de l'exprimer.*" Such an axiom doubtless presents at first sight a tremendous stumbling-block to the photographer who aims at fine art, and, of course, it is an obstacle to the attainment of such expressions and interpretations as those of such painters as Turner, and others, who carried the dignifying practice of their art to the point of exaggeration; and, in passing, it must occur to us that much should be allowed in a realistic age to those who, possessing the analytical in excess of the synthetical faculty, and feeling the truth of art to lie in literals, have swung on the pendulum of human thought, and intellect, so much in this direction, offering us, in place of more imaginative work, the mean, if intelligent, result of their conceptions. I was immensely struck by these extreme aspects of art in going down the Rhone last year, sketching and photographing for a book I was illustrating. From the steamer's deck I was bound to get my photographs if possible;—there was no time to sketch, of course—yet, although we were on historical ground so to speak, and every reach of the river presented some point of interest, there was literally nothing worth expending plates upon, that is to say, one could not get an adequate picture. We gave up the river and went ashore. I had taken one picture of an important French town which presented possibilities as we neared it, but I rejected the negative after development in London. Herein I showed my discretion, for a few months afterwards I saw a view of this very city, an old but magnificent coloured lantern slide, exhibited by Lieut. Gladstone—it was quite another thing. Here the artist had been at work; it was not the colour, but the careful, if instinctive, emphasis of characteristic elements in due subordination to the general pictorial effect. This view was undoubtedly taken from the river; our steamer had gone over the very spot, yet I was powerless to get the picture by any process of photography; literally you could do nothing with the scene, poetically you could do much; sitting in a boat using your sketch-book and your imagination, the view without undue exaggeration would gain upon you, and inspire the exercise of the pencil to the result seen in the transparency I have alluded to. Only the other day my opinion was asked by a friend as to the authenticity of a Turner. It was a very interesting work, "The City of Blois," with its triple towered cathedral and long white bridge. We compared it with the engraving;—Turner was much indebted to his engravers, though they worked under his guidance—considerable alterations had been made to suit the narrower proportions of the engraving; but everything was in favour of the genuineness of the picture. Now, said my friend, look at the photograph of the place; how startling! I was on the steamer's deck again, doing the rivers of France with a camera as I had been in the past summer, and if I did not feel the beat of the paddles I felt more strongly than ever what not to attempt to photograph. But it cannot be expected that those who have never made art a study in any way until it occurs to them one day to buy a camera will discriminate like this; they take what in courtesy is termed a picture, but, of course, they know not what they do. There have been and are some earnest photographers who take very independent views on the art question, and would emancipate it from all traditions, substituting their nineteenth century "go as you please" methods for all the lessons derivable from the great works of past ages. They will tell you that, whatever you photograph, Nature will give it its own dignity that no art of yours can add to. This so-called impressionism is still abroad; it has been scotched but not killed; and it is keeping photography back from the place it might occupy, and will check its growth and progress by ten or fifteen years, in spite of the efforts of the earnest men who, persevering according to their lights, have always endeavoured to bring photography and art together. Of course there have been mistakes—mistakes all round. The chronicle of the camera shows, just as certainly as the progress of any other study, the one step back to every two steps forward. The fact is, that in the study of photography, the technical difficulties have been so constant and so aggravated by the very developments of the science, and the ever-changing formulas and processes, that few men's minds have had the capacity, or even the leisure, to give for the assimilation of any ideas on art at all; and then, when the introduction of dry plates and simplified formulas cleared the ground, and rendered the study of photography in relation to fine art possible to ordinary minds; when they sought guidance in the fascinating field, they were enveloped in clouds and darkness, misled by *ignis fatuas*, and beguiled by false prophets.

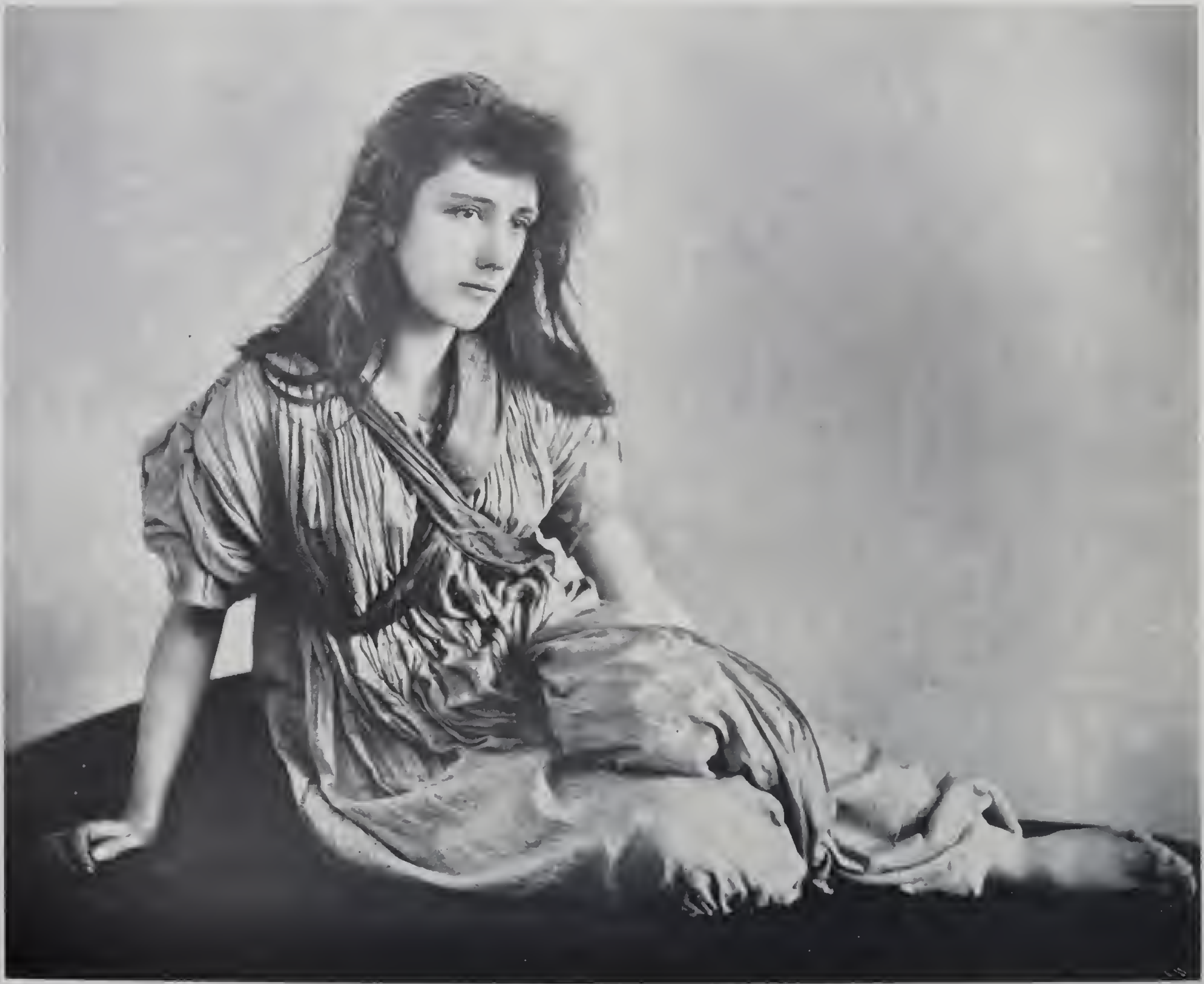
It is to the credit of photographers and their art that they have had the courage of their convictions, and persevered, however blunderingly now and then, to reach the goal under such disadvantages and discouragements, and we may hope for the future and the growth of those amateurs who believe in photography as allied to fine art. I am looking at some old work now—seven-and-thirty years since this was done, when England and France were thundering at Russia's doors with double knocks that echo still; these photographs of the east and the Crimea, made amid hurrying squadrons and the din of war, large pictures by the collodion process—nay, some I am told, by the waxed paper process—show a sense and feeling for art that is rarely rivalled now and never surpassed; these large plates were handled and developed in a tent, in a sultry clime, and clearly indicate that modern simplification in process has not much advanced the art in its highest sense. Photography was on the right track in Rejlander's time, although he occasionally indulged in vagaries. At that period men were feeling their way, and with less uncertainty than twenty years later; then came disaster on disaster, quick plates, instantaneous shutters, and apeishness of artistic dillettantism. Then the painters take up photography and tell you they put it down again, giving this as a verdict in a case they have not understood, and of which they cannot grasp the merits.

An important landscape painter, too, tells you just enough for you to learn that he condemns photography because he has not understood it; others follow with the same faint cry, all hopelessly at sea, and with one lens and one camera can find no harbour of refuge; some even revealing their fear that the camera might do away with the artist, without realising the fact that it cannot do without him. Then comes impressionism, however honest and hot-headed, to the rescue, making confusion worse confounded; and photographers maddened look for cure in quackeries, inclining to believe, for a while at least, that art must lie in process, not in thought, so taking to cranks and pranks in printing, blatant cry Eureka—Who shall unmesh the reckless tangle now? Only those who, quick to see the foibles of the time, keep undisturbed the even tenor of their way, knowing well that no process will supply the place of mind, nor Nature roughly wooed give any smile of art. If I have something lingered in this retrospect it is in no pessimistic spirit, but with the firm conviction that the tangle will be unravelled eventually, if not immediately. The good work at the exhibition I have spoken of is not accidental, but the result of principles of art followed continuously and noble success attained, the outcome of that persistence that ennobles previous failure.

The artist soon learns what to photograph when he has learnt what lenses will and will not do; and that some do learn this is proved by the use they make of the camera in the construction of their pictures. The result, however, is not arrived at with a thirty-shilling set of apparatus.

This paper is to suggest some solution of the difficulty to the amateur the question that has pressed itself upon all accomplished photographers, as I have endeavoured to show, What to photograph? A beautiful head, male or female, in a full soft light. No, it need not be a Rembrandt to be artistic; any one can photograph picturesquely on easy terms who is content to bury two-thirds of the picture in shadow, especially if the sitter is a good subject. And the background? Just so much as will relieve the portrait, with nothing darker in it than the shadows of the head, and nothing lighter than the half-tones of the face. Accessories? The fewer the better; a good portrait needs no distracting curtain or palm to accompany it; and, above all things, however you may be tempted, never photograph a portrait against a diapered wall, cut up with picture frames, mounts, and furniture, or that especial curse of civilised barbarism—the white lace curtain.

A group? Yes, if you can do it without flashlight, or furniture, or a greenhouse, or all the figures sitting in a row, or the heads all arranged, tier above tier, like cannon balls, or a floor-cloth pattern ; but this needs genius, and unless you have it, do not attempt a group. Groups in photographic portraiture are, as a rule—well, there is no word in any language I ever heard to express what they are—they are so utterly loathsome as to make one hate one's species, and be homicidal ; even among artistic groups of two or three figures, there are only a very few at recent exhibitions that are successful absolutely. These, however, are surprisingly so. It is not given to many amateurs to do this kind of work ; it only comes, if at all, after years of study of art. A man must be able to do without the camera before he can do a group with it. Landscape ? Anything where the interest centres in some object picturesque in itself ; it may be a cloud, a tree, a wave, a building ; the more the interest centres in the object the better the result will be in photography. You have no colour, remember, to play with the eye, and keep up its interest over many planes, as in painting. The same rules as to selection of subject do not apply, although they do as to linear composition and perhaps *chiaroscuro*. If any one tells you not to get this object sharp, you may look upon him as a dreamer, and a person who, by a parity of reasoning, and principle, would, were he writing, make his most important sentences vague and indefinite, and in so doing imagine he was a poet. There are some so-called poets who have done this, but their names are neither Homer, Shakespeare, Milton, Dante, nor even Gray, Byron, or Scott. If you are photographing the sea you should try, so to speak, to epitomise it by the emphasis of one wave, or group of wavelets. The rest is really unimportant, except that by its vagueness, the emphasis is allowed to rest upon that which rivets the attention and intelligence, and allows the imagination some opportunity of completing the picture for itself. Oh, I shall be interrupted by some, this is not making the most of photography ! I answer it is making the best use of art by photography, and unless you can do that, you had better let photography alone.



Woodburytype Company.] [Eveleen Myers.

"THE BEGGAR MAID."

The same rule applies to the fields and the trees. Give us one-quarter of the picture in the foreground sharp, as nearly opposite the point of station as may be, and where, if one liked, one might count some of the leaves; but do not trouble us by the desire to count them over the other three-quarters : that may be photography, but it is not art. The combined definition in the foreground, and indefiniteness in the receding planes, is much simplified by the presence of mists. Any one comparing a pleasing scene taken under such conditions with one taken in a clearer atmosphere, and with the lens stopped down immoderately, will not fail, if there is any artistic feeling in him, to see the force of the comparison and the validity of the rule I enjoin. It is a great mistake to suppose that you will get the finest work upon the finest days; it is often very difficult, indeed, to get an artistic picture—be the subject ever so well composed in line—on a clear, bright day. True, you can get an excellent photograph, as a photograph, if you are careful, with definition sharp enough all over to please a microscopist, but I suppose the amateur photographer to want something more artistic than this. I saw a beautiful photograph of the Royal Exchange the other day, taken years ago instantaneously by Mr. Valentine Blanchard. The picture was not only capitally chosen for composition in line, but it had that much rarer excellence, aerial perspective. Doubtless, London, and our English provincial towns, lend themselves to this, as does our scenery generally; but my experience is that the photographer, as a rule, does not sufficiently appreciate this, and does not think enough of a misty day. The value of the picture of the Royal Exchange was to me immensely enhanced by the fact of Cornhill and Threadneedle Street being—what the sharp-all-over-men would have termed—vague smudges. I do not know whether Mr. Blanchard set out to do this of artistic *prepense* then, but I shall credit him with it because he would certainly do so now. It is not my purpose or province here to treat of composition in line or masses, but it must be remarked that, without an adequate study of this, all will be in vain. A knowledge of the application of the principles in the field can only be obtained, and what to photograph in this regard is only discovered after having made a selection from perhaps a dozen points of view.

In conclusion, and with the purpose of showing some modern instances of successful composition, and those that are in every way applicable to photography, I call attention to one or two pictures in the present Royal Academy Exhibition. Nos. 76 and 468 are especially excellent in landscape. The amateur would do well to ponder over Mr. Adrian Stokes' delightful picture, and learn much from it in regard to subordination. There are several pictures connected with seaside life that are apparently derived almost entirely from photographs, and would seem to have gained little by translation into colour. But the picture that must commend itself above others of its class, as of the highest value to the student of composition, is the wonderfully powerful "Doctor" of Mr. Luke Fildes.

PHILIP H. NEWMAN.

ON THE TONING OF IMAGES PRODUCED FROM SILVER BROMIDE.

ALTHOUGH the toning of printed-out sensitised paper has received a large amount of attention from photographers, it does not appear that any systematic attempt has yet been made to discover practicable methods of altering the character of the developed silver bromide image by means of platinum, gold, or other solutions.

The object of so doing would be twofold: viz., to enhance the permanency of the image, and to so alter its colour as to make it resemble that obtained by other processes.

With these objects in view, and in hope of stimulating further research in this direction, the following investigation was undertaken.

The first experiments were made upon methods of

Toning the Fixed Image Directly.

A sheet of Eastman "B" paper was exposed for a short time to actinic light, developed in eikonogen* until black, fixed in strong fresh hypo., washed for four hours and dried. The sheet was then divided into pieces, which were used in the next experiments.

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* A.—Eiko. . .	40 grs.	B.—Dry pure sodium carbonate . .	240 grs.	C.—Potass. bromide . .	120 grs.
Sod. sulphite .	240 ,,	Water . .	5 oz.	Water . .	1 oz.
Citric acid .	10 ,,				
Water . .	15 oz.				

3 vols. A.; 1 vol. B.; *quant. suff.* C.

The stock solutions of platinum and gold consisted of:

A.—Potassium chloroplatinite, 5 grs.; water, 1 oz.
B.—Chloroplatinic acid, 6 grs.; water, 1 oz.
C.—Gold sodio-chloride, 5 grs.; water, 1 oz.

The potassium chloroplatinite was the Platinotype Company's platinic salt; the gold sodio-chloride that commonly sold as gold chloride in 15-grain tubes; the chloroplatinic acid was made by dissolving metallic platinum in aqua regia, evaporating down to syrupy consistency, adding strong hydrochloric acid and again evaporating down until fumes of gaseous hydrochloric acid ceased to be evolved.

Made up in these proportions each solution contains approximately the same weight of metal in a unit volume of liquid.

The stock toning solutions were of course considerably diluted for use, as will be pointed out further on.

Three pieces of paper (2, 3, 4) were now placed for half an hour in the toning solutions given in Table A., and, having been washed, each piece was divided into six smaller portions, which were in turn placed for half an hour in the bleaching, etc., solutions, also mentioned in Table A., the amount of toning being estimated by the average amount of alteration each piece of paper underwent as compared with the effect of the same solutions upon a piece of paper (1) which had not been toned at all.

The following were the test solutions employed:

(*a.*) Mercuric chloride, 10 grs.; hydrochloric acid, 10 drops; water, 1 oz.

(*b.*) Bleaching lime, 10 grs.; water, 1 oz.; with sufficient hydrochloric acid to yield a clear solution.

(*c.*) Cupric chloride, made by dissolving 10 grs. cupric oxide in hydrochloric acid, and diluting to 1 oz. with water.

(*d.*) Ferric chloride, 10 grs.; hydrochloric acid, 10 drops; water, 1 oz.

(*e.*) Strong hydrochloric acid, 3 drs.; strong nitric acid, 1 dr.; warmed together until yellow, and the mixture diluted to 2 oz. with water.

(*f.*) Strong nitric acid, 2 drs.; water, 6 drs.

TABLE A.—EFFECT OF VARIOUS RE-AGENTS.

PROCESS ADOPTED.	*a.*	*b.*	*c.*	*d.*	*e.*	*f.*
1. Fixed untoned paper.	Completely bleached	Completely bleached.	Bleached—Very slight yellowish brown residue.	Bleached—Very slight grey residue.	Completely obliterated.	Completely obliterated.
2. Paper fixed and toned in: Potass. chloroplat. 4 drops Nitric acid 4 ,, Water 1 oz.	Bleached—Light yellowish brown residue.	Almost completely bleached—Very slight yellowish residue.	Bleached—Slight yellowish brown residue, more considerable than 1.	Bleached—Slight yellowish brown residue.	Considerable blackish residue.	Practically unchanged.
3. Paper fixed and toned in: Chloroplat. acid 4 drops Nitric acid 4 ,, Water 1 oz.	Same as 2.	Same as 2.	Same as 2.	Same as 2.	Slight blackish residue.	Same as 2.
4. Paper fixed and toned in: Gold sodio chloride 4 drops Nitric acid 4 ,, Water 1 oz.	Bleached—Considerable bluish black residue.	Same as 2.	Bleached—Slight blackish residue.	Bleached—Slight grey residue.	Completely obliterated.	Completely obliterated.

From this it would appear that a certain amount of noble metal was deposited from all the toning solutions used, and as there seemed little to choose between platinum in the platinous or platinic conditions, the next experiments were made with chloroplatinic acid and gold only.

Three exactly similar prints having been made, fixed, and washed, two of these (6, 7) were placed in the platinum and gold solutions, the other being reserved for comparison. The results are shown in the next table.

TABLE B.

PROCESS.	GENERAL COLOUR.	HIGH LIGHTS.	INTENSITY.	RATE OF TONING.
5. Untoned print.	Brownish black.	Pure.	Normal.	—
6. Platinum toned print.	Warm purple black.	Pure.	Normal.	Least.
7. Gold toned print.	Light bluish purple.	Stained purple red.	Slightly reduced.	Greatest.

It would, then, appear practicable to tone a finished bromide print with platinum, but not with gold.

The next experiments had for their object investigating the possibility of

TONING THE DEVELOPED BUT UNFIXED IMAGE.

Bearing in mind that the silver reduction product formed on exposing silver albumino-chloride to light, as in a printed-out and washed but unfixed silver print, is more readily toned with gold than the silver derived from this reduction product after treatment with hypo., it appeared highly probable that the same result would hold good with silver bromide.

To test the correctness of this view, a piece of Eastman bromide paper was exposed to light developed as before until black, rinsed under the tap, steeped for five minutes in water acidulated with $\frac{1}{80}$th of its bulk of strong nitric acid, and again washed for five minutes. In ordinary daylight the paper was then divided into four portions (9, 10, 11, 12), the first of which was not toned, the others being placed for half an hour in the platinum and gold solutions. At the expiration of this time each of the pieces, together with another piece (8) of the same paper fixed in hypo. and washed, were divided into six smaller portions and placed in the test solutions previously used.

The results are shown in the next Table.

TABLE C.—EFFECT OF VARIOUS RE-AGENTS.

PROCESS ADOPTED.	*a.*	*b.*	*c.*	*d.*	*e.*	*f.*
8. Fixed and untoned paper	Completely bleached.	Completely bleached.	Bleached—Faint yellowish residue.	Completely bleached.	Practically unchanged.	Very slightly bleached.
9. Unfixed and untoned paper.	Completely bleached.	Same as 8.	Bleached—Faint purplish residue.	Bleached—Faint reddish brown residue.	Bleached—Considerable bluish black residue.	Slightly bleached.
10. Unfixed paper toned in potass. chloroplat.	Bleached—Considerable reddish brown residue.	Bleached—Very slight yellowish residue.	Bleached—Faint greyish residue.	Same as 8.	Very slightly bleached.	Practically unchanged.
11. Unfixed paper toned in chloroplatinic acid.	Practically unchanged.	Bleached—Slight yellowish residue.	Bleached—Considerable greyish residue.	Bleached—Very faint greyish residue.	Same as 8.	Same as 10.
12. Unfixed paper toned in gold sodiochloride.	Practically unchanged.	Same as 9.	Bleached—Considerable bluish black residue.	Bleached—Considerable greyish residue.	Same as 8.	Same as 10.

It is evident from this that toning had again occurred, and comparing these results with those obtained by toning after fixing, it appeared that the amount of noble metal deposited upon the unfixed image was greater than that deposited upon the fixed image—a result which might have been predicted from theoretical considerations.

A comparison similar to that previously made was next instituted between three exactly similar prints, and the results are shown in the next table.

TABLE D.

PROCESS.	GENERAL COLOUR.	HIGH LIGHTS.	INTENSITY.	RAPIDITY OF TONING.
13. Untoned and fixed print.	Brownish black.	Pure.	Normal.	—
14. Print toned with chloroplatinic acid, and then fixed.	Greyish black.	Pure.	Very slightly reduced.	Least.
15. Print toned with gold, and then fixed.	Purple black.	Pure.	Very slightly reduced.	Greatest.

The results obtained by the last experiments being highly encouraging, it appeared desirable to institute a critical comparison between the two processes, using platinum in the platinous and platinic conditions as well as gold.

Eight prints were therefore made, and the results obtained with them are shown in next table.

From this it would appear that the only toning agent capable of giving a jet black picture, from an original brown one, is chloroplatinic acid used after fixing the same salt used before fixing giving a very pleasant purple-black. Potassium chloroplatinite, on the other hand, appears to be quite unsuitable for use before fixing, but when employed after fixing it gives a black tone, very similar to that obtained with chloroplatinic acid—the reduction in intensity being slightly less with the platinous than with the platinic salt.

Gold gives a purple, either before or after fixing, but in the latter case the paper becomes stained more or less.

The use of the dilute nitric acid after developing had its origin in theoretical considerations. To test whether these were correct a print was made, and divided after development into two portions. One was washed for five minutes in plain water; the other, after rinsing off the developer, being placed for the same time in the nitric acid. Both halves were then transferred in actinic light to the platinum toning solution, and subsequently fixed and washed. The high lights of that half which had not been treated with nitric acid was distinctly yellow, whilst those of the other remained quite pure—the yellowing being evidently due to the action of the trace of eikonogen left in the pores of the paper upon the toning solution, to the action of actinic light upon the unfixed image, or to both causes combined.

TABLE E.

PROCESS.	GENERAL COLOUR.	HIGH LIGHTS.	INTENSITY.	RAPIDITY OF TONING.
16. Print fixed in ordinary way.	Warm brown.	Pure.	Normal.	——
17. Print fixed, washed, and toned with platinous salt.	Practically same as 16, no toning having taken place.	Pure.	Normal.	Least.
18. Print fixed, washed, and toned with platinic salt.	Purple black.	Pure.	Slightly reduced.	Next after 19.
19. Print fixed, washed, and toned with gold.	Purple.	Stained blue.	Slightly reduced.	Greatest.
20. Print developed, treated with $\frac{1}{20}$ HNO_3, and placed in water for half hour, then fixed.	Similar to 16, but distinctly colder.	Pure.	Normal.	——
21. Print treated as 20, but toned with platinous salt before fixing.	Black, with trace of brown.	Pure.	Normal.	Greatest.
22. Print treated as 20, but toned with platinic salt before fixing.	Jet black.	Pure.	Very slightly reduced.	Least.
23. Print treated as 20, but toned with gold salt before fixing.	Purple.	Pure.	Very slightly reduced.	Next after 21.

The next experiments were made to test the possibilty of improving a bad print.

A print was given an exposure ten times the normal one, developed with eikonogen highly restrained with bromide, divided into halves and treated as before. Result: Untoned half, of a disagreeable brownish red colour ; toned half, a deep black.

A print was next given an exposure five times too great, and developed with normal eikonogen, the developer being washed off after the high lights had been slightly degraded, which occurred in less than a minute. The print was then divided into two halves, and treated as above ; and, after fixing, both halves were treated with Farmer's reducing solution (potassium ferricyanide, and hypo.) until a proper reduction in density was arrived at. Result: Untoned half, image of a disagreeable foxy red and very flat ; toned half, image of a light blue black, and rather less flat than that on the untoned half.

It appears possible, therefore, not only to improve a print of a bad colour, but if, after fixing, the image appears too intense it can be reduced if toned without materially affecting its character.

Platinum toning carried out as described above, although simplicity itself when applied to positives-by-reflected-light (prints), is hardly applicable to positives-by-transmitted-light (transparencies) in which the colour has to be judged by looking through the film.

It appeared, therefore, advisable to work out a process of

Toning the Fixed Image Indirectly.

The preceding experiments having shown the practicability of toning the reduction product formed by development, it appeared probable that by re-converting the silver of the fixed image into silver bromide, or chloride, and then redeveloping and toning this, a similar result would be obtained.

Since chlorides are cheaper, and more readily procurable, than bromides, the experiments were confined to the chlorination of the silver image. This, as is well known, can be effected by mercuric, cupric, and ferric chlorides, by free chlorine, and by many other substances.

As, however, the action of mercuric chloride upon silver results in the production of mercurous chloride, conjointly with the chlorination of the silver, and as this mercurous chloride blackens on development and so produces intensification, the employment of that particular re-agent was inadmissible. Experiments were therefore made with cupric and ferric chlorides and free chlorine only.

To chlorinise the image, the previously mentioned solutions of these substances were employed, and in these solutions squares of bromide paper, blackened by development and fixed and washed, were left until thoroughly bleached, then again washed, and the redevelopment of the deposit effected by the same eikonogen developer used before.

With the deposit bleached with chlorine or cupric chloride, no staining took place during redevelopment, but with that bleached by means of ferric chloride a brown stain occurred, a result easily traced to the interaction between the eikonogen and the traces of ferric chloride remaining in the paper; but on substituting a ferrous oxalate[*] developer for the eikonogen, no staining took place.

With eikonogen as a redeveloper, chlorination, by means of ferric chloride, is therefore practically out of the question.

A large piece of blackened paper was next chlorised with cupric chloride, and when quite bleached the paper was washed for a few minutes and the deposit redeveloped with eikonogen. When fully developed the eikonogen was washed off, and the paper placed in nitric acid diluted with eighty times its volume of water.

The paper was then divided into halves; one half was reserved for subsequent treatment, and the other was placed for half an hour in the acid solution of chloroplatinic acid previously used.

Small portions cut from each piece were then placed for half an hour in the chlorinising, etc., solutions previously used, and the results are shown in the next table.

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[*]

A.—Potass oxalate	6 oz.	B.—Ferrous sulphate	3 oz.
Oxalic acid	10 grs.	Water	10 ,,
Water	30 oz.		

3 vols. A 1 vol. B.

Experiments made with free chlorine and ferric chloride, followed by eikonogen or potassium oxalate, gave identical results.

These experiments at once suggested a

Practical Method of Toning Bromide Transparencies with Platinum.

Taking a Thomas' lantern-plate, it was given a normal exposure, developed, fixed, and washed, the image chlorised with free chlorine, again washed and redeveloped with ferrous oxalate. Half of the plate was then placed in the chloroplatinic acid, and after remaining therein for fifteen minutes was found to have been toned a dead black.

Table F.—Effect of Various Re-agents.

Process Adopted.	*a.*	*b.*	*c.*	*d.*	*e.*	*f.*
24. Bleached and redeveloped deposit.	Bleached.	Bleached.	Bleached.	Bleached.	Faint grey residue.	Slightly bleached.
25. Bleached, redeveloped, and toned deposit.	Practically unchanged.	Brownish residue.	Brownish residue.	Blackish residue.	Practically unchanged.	Practically unchanged.

To compare this method of toning with the previous ones, four Thomas' plates were exposed and developed with ferrous oxalate. One (27) was placed in chloroplatinic acid and then fixed; the second (28) was fixed and subsequently toned; the third (29) fixed, washed, chlorised, redeveloped, and then toned; the fourth (26) being merely fixed in the usual way.

The next table shows the results obtained :—

It would appear, therefore, that, so far as the final result is concerned, there is little to choose, but as it is generally necessary to observe the gradual change of colour, we are really limited to 28 and 29; and, as regards these, if the image is a little too dense, it may be toned after fixing, whilst if no reduction in intensity is desirable, the image can be chlorised and then redeveloped and toned.

Experiments were next made on

Toning during Development.

A test-tube experiment having shown that ferrous oxalate reduces chloroplatinic acid in a slow and regular manner, it appeared probable that, by mixing the oxalate developer with this platinum salt, a solution would be obtained capable of developing and toning simultaneously.

To test this conclusion, an ounce of the usual ferrous oxalate developer was mixed with four drops of the chloroplatinic acid, and this was used to develop one-half of an exposed transparency plate, the other half being developed in the usual way. As might have been foreseen, the platinic chloride acted as a restrainer, with the result that, whilst the half in the usual developer reached normal intensity in three minutes, that in the platinum-oxalate developer took fifteen minutes to develop.

Table G.

Process Adopted.	General Colour.	High Lights.	Intensity.	Rapidity of Toning.
26. Fixed and washed transparency.	Warm black.	Normal.	Normal.	—
27. Transparency toned before fixing.	Dead black.	Normal.	Normal.	Greatest.
28. Transparency toned after fixing.	Dead black.	Normal.	Very slightly reduced.	Less than 27.
29. Transparency chlorised, redeveloped, and then toned.	Dead black.	Normal.	Normal.	Least.

By transmitted light, a slight difference in colour between the two halves was perceptible, but on treating both with cupric chloride the bleaching action was practically equal, showing that the amount of platinum deposited in this way is too small to render the process of any value.

A fixed plate was next placed in the platinum-oxalate mixture, and it was found that toning occurred just as if the platinum solution had been merely diluted and acidulated with nitric acid, but that to obtain any material change in colour a very prolonged immersion in the solution was necessary.

A final series of experiments were now instituted to test the possibility of gold-toning bromide prints in such a way as to obtain

Albumin Tones from Black Bromide Images.

In the toning of albuminised paper, we start with a reddish basis of silver reduction product, upon which metallic gold is deposited, the toning being due to the commingling of the colours of the red reduction product and the purple or brown metallic gold. To obtain an analogous result with silver bromide would at first sight appear impossible, since no method of development yet devised yields an unfixed bromide print of a colour at all approaching that of a washed print on albumenised paper.

But, as is well known, a reddish deposit can be easily developed up from a silver-chloride basis, by employing a suitable developer; and as the chlorination of the black or brown image obtained with silver bromide is easy, it seemed reasonable to suppose that the silver chloride so formed, being in gelatine, would behave similarly to the same substance emulsified direct.

To test the truth of the surmise a series of exactly similar bromide prints were made in the usual way.

One print having been reserved for comparison the remainder were chlorised with cupric chloride in non-actinic light, then exposed to actinic light and redeveloped with ferrous magnesium citrate.*

It was found, however, that the resulting image was dead-black.

Bearing in mind that the addition of a restrainer and prolonged development tends to alter the colour of the deposit, 30 grs. of ammonium chloride were added to another ounce of developer and

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* A.—Citric acid . . .	120 grs.	B.—Ferrous sulphate . .	140 grs.
Magnesium carbonate	76 ,,	Water	1 oz.
Water . . .	1 oz.		

3 vols. A. to 1 vol. B.

the whole diluted with its own volume of water. On trying this developer upon another print, the colour, though redder than before, was still not red enough.

A fresh ounce of developer was next mixed with 30 grs. each of ammonium chloride and citric acid, and then diluted with its own volume of water, and gave a very promising result—the image being almost brick-red.

On attempting to repeat the result with another print it was found that the colour was now much blacker than before, a result which was soon traced to the fact that the latter print had remained for a longer time in actinic light prior to redevelopment.

It thus appeared evident that the chlorination of the image being effected in non-actinic light, the print should have been subsequently exposed to actinic light for a *definite* length of time. It was found by trial that in order to get a brick-red colour on redevelopment the duration of the re-exposure had to fall within very narrow limits—limits so narrow in fact as to render the process of comparatively little value.

Experiments were next made upon the possibility of darkening the silver cholide by direct exposure to light, but resulted, as might have been expected, in the production of a black image only.

Remembering that traces of iron salts were found by Carey Lea in red silver photo-chloride, prepared by the inter-action of silver and ferrous salts, the experiment of exposing the chlorised image to light beneath the surface of ferrous sulphate appeared worth trying, and on putting the idea into practice it was found that the silver chloride slowly changed to a deep brick-red.

The change, however, took place with extreme slowness, two hours of sunlight being necessary. But a few experiments revealed the fact that the addition of citric acid to the ferrous sulphate materially reduced the duration of re-exposure.

Three chlorised prints were then exposed to sunlight beneath a solution containing—ferrous sulphate, 150 grs.; citric acid, 150 grs.; water, 1 oz.; and when quite red the iron was removed by half-an hour's immersion in running water. One of these was then placed in (1) the acid solution of chloroplatinic acid previously used, the next in (2) a solution of gold sodio-chloride acidified with nitric acid, and the third in (3) an ordinary borax toning bath. In (1) and (2) the prints turned to a dingy grey black, whilst in (3) the print toned through various shades of brown to a full purple-black. On subsequently re-fixing the gold-toned print (a necessary precaution to obviate subsequent alteration on exposure to light) a slight reduction in intensity occurred, and the tone got slightly colder.

To put beyond doubt the fact that gold-toning had really occurred, the print was placed, after washing out the hypo., in the cupric chloride solution for half an hour; then again washed and returned to the fixing bath, with the result that the image, which, after chlorination and before fixing, had been barely visible, was now actually rendered more visible by the hypo. dissolving out the silver chloride previously mixed with the fine particles of deposited gold.

CLEMENT J. LEAPER.

AUTOTYPE PRINTING IN PIGMENTS.

THIS process, better known as the carbon process, although it has been before photographers in its present perfect state since Johnson's last patent in 1868, is perhaps the least used of any process by amateurs of the photographic art. The simplest of all processes, and capable, as it is, of producing effects which none other yet invented can approach, it has never hit the fancy of this great body of workers.

I have not space to examine into all the arguments that can be adduced in its favour, or to speak of those advocated against it; but let me just place a few facts concerning its working side by side with some concerning that process which so quickly found favour and ousted silver printing from its place as the most popular of printing processes in use,—I speak of platinotype.

The older process, besides giving the greatest possible range of colours,—whereas platinotype only gives two, a black and a doubtful sepia,—is just as permanent as its rival. Its colours, being the pigments themselves, are perfect. The control possessed over development—it being a gradual instead of an instantaneous one—renders its results more certain, besides giving the power to the worker of producing any effect he may wish *at the time of development.*

The only chemical required through the whole process is alum. And, lastly, it is cheaper; and this, although last, is, I regret to have to say, a great point with the majority of workers.

What mystery is it that hangs over this process and makes the older and younger amateurs shake their heads as though it was indeed going into the "Black Art" to produce prints thus? Well, it does look a little dirty at one stage, and does not look like a print; but that is all.

However, to my subject. The first print must be by the single transfer process. If the negative has been taken for silver printing, a reversed image will be the result,—reversed as regards right and left; but of this I will deal further on.

Tissue.—This consists of paper coated with a pigmented gelatine, which to render sensitive to light is soaked in a 5 per cent. solution of bichromate of potash for a minute or two. The light, acting on this sensitive coating of gelatine, renders the parts to which it is allowed access insoluble in hot water, while those parts which the light has not reached still remain soluble. It should be handled by gas or lamplight. Do not attempt to make your tissue, and do not attempt to sensitise it. Machines are used in its manufacture by the Autotype Company; and it is doubtful whether any hand work, especially that of amateurs who do not devote their whole time to it, will come up to this.

Further, as every one knows, there are two sides to photography, —art and science; and a man cannot be perfect in both. Amateurs aspire to become as perfect in the art side of photography as possible, and nothing but an undivided attention will accomplish this. You have not time to compete with machines in the manufacture of anything of this kind; your whole attention must be devoted to obtaining results which will bear the application of the word "art," and you will then find that a long life's work lies before you.

Buy your tissue ready sensitised and cut to the size you work. You may waste a few pieces, but I am confident you will make this up in results.

Printing.—Before placing the negative in the printing-frame cut a mask in black paper or paint a line of black varnish about $\frac{1}{8}$th of an inch wide round the margin of the negative, that will protect the edges of the tissue during exposure. This shielding of the edges is called the safe-edge, and is necessary to prevent the breaking or tearing of the tissue during the stripping before development.

It is better to place a piece of india-rubber cloth behind the tissue before closing down the back of the frame; besides promoting an even pressure, it keeps out damp air, which acts on the tissue very quickly, and destroys the whites.

There being no visible action of light on the tissue, we must have a means of ascertaining the duration of exposure of our print. An actinometer fulfils this purpose. There are several in the market, notably Johnson's, Sawyer's, and Burton's. They are equally good, although acting on different principles,—Johnson's being by tints on a coloured ground, Sawyer's by a numbered scale, and Burton's by a scale of small negatives.

But working equally as well as either of these is a small home-made instrument; and as it costs nothing, if any amateur has half an hour some evening to spare, he cannot devote it to any better purpose than making this.

Clean a $\frac{1}{4}$-plate negative and cut it into four strips, each half an inch wide,—a red-hot poker drawn quickly across the glass will do this admirably if nothing else is handy. Cut four strips of ruby paper to fit; now take two of the strips of glass, and insert between them three of the strips of ruby paper, and bind together as you would a lantern slide, using the binder sold for that purpose. The remaining piece of ruby paper is divided by pencil marks into eight divisions, in the centre of each of which a hole is punched. A little starch or gum will stick this to one of the remaining strips of glass. On to the other side of the glass paste a piece of thin white paper. Now take another piece of paper, half an inch shorter than the glass, and stick that on top of the first piece. You now have opposite the first hole in the ruby paper one piece of white paper, and opposite the second hole two pieces. Repeat this, using each time a piece of paper half an inch shorter than the last as often as necessary, so that the first hole will have one, the second two, the third three, and so on, and the eighth eight pieces covering it, and corresponding to densities from one to eight. Number them so, and cover with the remaining piece of glass. Now place these, what are practically two pieces, together, inserting along the edges two thin pieces of cardboard, to prevent them absolutely touching, leaving room, in fact, for the insertion of a strip of silver paper. Bind them in position, and the actinometer is complete. To use, it is necessary to first time three negatives by experiment,—a thin, a medium, and a dense one; and from these judge the exposure others may require. Tints numbered two, four, and six will be the best to start the trial exposures from, the number being increased or decreased as necessary.

Where a commercial instrument is used, it should be ascertained by comparison the printing density of each negative, the paper being placed beneath that tint. Place your actinometer beside the frames at the commencement of printing, and do not touch them until the correct tint has been reached.

Development.—We now require a metal dish and a gas or spirit lamp for the development, a thermometer registering at least 190°, two dishes, one for cold water, and the other for the alum solution, a squeegee, and some single transfer paper. Immerse the exposed tissue and a piece of single transfer paper in a dish of cold water. As soon as the tissue—which will, on immersion, curl—straightens itself, bring the two together under the water, the two gelatinised surfaces being in contact, lift out and squeegee all the water and air from between them, and place between blotting-boards under a slight pressure for a few minutes. Clean water should have been placed in the metal dish, and the lamp inserted beneath it, so that by the time the first operation is complete the water will show a temperature of 105°. Into this hot water place the adherent pieces of tissue and transfer paper. In a few seconds the gelatine will be seen oozing out at the edges of the tissue. When this happens, take hold of a corner of the paper on which the pigmented gelatine was spread, and raising it gently it will be found to peel off, leaving the greater mass of gelatine adhering to the transfer paper, which will form the support of the print. Lave this with the hot water, and you will soon have the satisfaction of seeing a beautiful picture emerge from the dirty mass of coloured gelatine. Care should be taken that the water does not rise beyond 110°, as frilling of the film would then occur. As soon as development has been carried far enough, the print should be plunged into the cold water, and allowed to remain for a few minutes, that the gelatine may set. To finally complete the picture, place in a 5 per cent. solution of alum for ten or fifteen minutes, or even longer, and afterwards hang up to dry. This, in addition to hardening the gelatine, discharges the remaining bichromate salt.

I now intend dealing with those parts of the double transfer process which differ from that already treated.

As I mentioned before, with negatives taken in the ordinary way, the single transfer process results in a print reversed as regards right and left. This is caused by the necessity for developing the prints from the back. To overcome the objection of having reversed prints, a process has been devised of mounting the print on a temporary support for development, and then transferring to the final support. The soapy effect given to the print by this operation, however, tells much against its popularity.

Instead of mounting the exposed tissue on the single transfer paper, procure some temporary support and waxing solution, and, with a piece of flannel dipped in this, polish the support. After allowing to stand for a few hours mount on this and develop as formerly. When the print is quite dry, obtain some final support cut to suitable sizes, and immerse in a 2 per cent. solution of alum for an hour. Then place both print and final support in clean cold water for a few minutes, remove them from this into a dish of tepid water, and bringing both surfaces into contact underneath the water, lift out and apply the squeegee to induce absolute contact. Hang up to dry, and when this operation is completed the temporary support will easily strip, leaving the picture in its proper position on the final support. If a temporary support of matt surface celluloid be used, the resulting prints will possess a beautifully even matt surface, without glaze even in the deepest shadows.

Let me conclude with a few short notes. To take reversed negatives for the single transfer process reverse the focussing-screen of your camera by placing the rough or ground side of the glass outside, and then place your plates in the dark-slide with the glass side towards the lens. Care must, however, be taken that the glass is clean. Prints may be copied in this way, and the results then printed in carbon ; or a carbon transparency may be made from the original negative, and another negative made from that.

The glasses for transparencies should be coated with a 5 per cent. solution of Nelson's No. 1 gelatine, with sufficient bichromate of potash added to produce a decided sherry tint, and dried in daylight. Develop tissue in ordinary daylight ; but before development handle in candle or gaslight if you wish to obtain clear whites. Use colder water for under-exposed and hotter water for over-exposed prints,—not above 110°. Develop within twenty-four hours of exposure if the print has been fully exposed. By placing partially exposed prints in a damp atmosphere, exposure may be completed without the aid of daylight at the rate of a tint in twenty-four hours. The heating lamp may be dispensed with,—a boiling kettle acts equally well. Add a little more hot water as that in the dish cools. The Autotype Company's tissue keeps well for a fortnight, and may be used up to three weeks by cutting a quarter of an inch off the edges all round just before exposure,—a month if kept in a very dry room. For pictures on opal, simply squeegee the exposed tissue on to the ground surface of the opal. The temporary support may be used over and over again. Re-wax each time.

G. H. James.

IN HOLLAND WITH A CAMERA.

LOVERS of the quaint and picturesque will find in Holland—teeming as it does with old-world reminiscences in its queer architecture and decoration—a succession of scenes which cannot fail to charm the artistic perceptions of the most fastidious. Its older towns seem to be drowsily dreaming away a peaceful existence over tree-shaded canals, save when their slumbers are rudely broken by the bustle and confusion of the weekly market. Mutely, but eloquently, they invite the artist to depict their quaint beauties, and possess such subtle charms that one cannot help leaving them with a feeling much akin to regret.

In jotting down these few notes on a photographic trip in this delightful country, I wish, whilst endeavouring to picture some of its most characteristic towns, to give my readers a few hints as to the best means of getting from place to place.

The trip taken extended from Rotterdam to Alkmaar; and finding, as we did, the smaller towns visited to be by far the most artistically attractive, I will but briefly mention Rotterdam, The Hague, and Amsterdam, all of which are more or less well known.

The steamer from England usually lands the traveller at Rotterdam early in the morning; and, having slept on board whilst crossing, he has on arrival a clear day before him. Spend it here, among the tall, narrow, gabled houses, and the tree-lined canals of Rotterdam. These canals, crossed by countless swing and drawbridges, and crowded with strange-looking barges, provide an almost endless variety of pictures for the photographer, and present an ever-changing panorama of curious sights to his somewhat bewildered gaze.

The first halting-place after leaving Rotterdam was Delft.

Avoid the railway, and go in preference by a small steamboat, which starts hourly from a quay near the Delft Poort, one of the remaining city gates; and, after exploring Delft, you can easily get on to The Hague in the evening, by tram-car. 'Tis a charming little trip to Delft, along a broad, placid canal, its banks fringed with a luxuriant growth of graceful reeds, which here and there undulate, wavelike, as the passing breeze sweeps over them. On either hand an almost unbroken expanse of broad green fields stretch out towards the horizon, intersected at intervals with small dykes or ditches, and speckled with black-and-white cows. Dotted about on the banks are many curiously thatched windmills, and queer wooden houses, gaily painted. After passing through a quaint Dutch village, the boat rounds a bend in the canal, and then, right ahead, the towers and spires of a town are seen in the distance. Rapidly they draw nearer and nearer, till at length the boat moors alongside a little quay, and we step ashore in Delft.

Truly a pleasant old town is this Delft, with its shining canals, trimly bordered with lime trees, reflecting in their calm waters quaint old houses and tapering spires, relics of a bygone age. Work for the camera abounds on every side. One or two good pictures can be taken from the landing-quay, looking up the canal, which is crowded with a wealth of blunt-nosed barges and boats of antique build; although the varied architectural features of the town claim the larger share of the photographer's attention. One of the most historic and interesting buildings is the Prinzenhof, or Palace, around whose grim walls still clings the gloomy memory of the death of William, Prince of Orange, to whom the Dutch owe their national independence. Here, in 1584, he died, slain by a hired assassin, and in the Niewe Kerk close by is a monument erected to his memory. The Prinzenhof is now used as a barrack; but the interior can be inspected. Opposite the Prinzenhof is the Oude Kerk, a fifteenth-century Gothic edifice, chiefly remarkable for its tower, which is somewhat out of the perpendicular. The Niewe Kerk, with its slender twin spires, stands in the Groote Markt, and facing it is the noble Stadhuis, or Town-Hall. This square, grey, stone building is a fine specimen of early seventeenth-century architecture, and is enriched with much carving. Rising from the centre of the structure is a massive clock-tower, from which at intervals the rich-toned chimes peal out over the sleepy old town. Behind the east end of the Niewe Kerk is a small canal, which, followed a short distance to the southward, will bring you to the only remaining city gate,—the Oos Poort,—a very interesting "bit."

The Hague we will pass over, and will but briefly glance at its neighbour, Scheveningen. Once but a poor fishing village on the bleak coast of the North Sea, Scheveningen is now the fashionable resort of the wealthy Hollanders. The town is a queer mixture of old and new, riches and poverty. Motley groups of fishermen lounge about the streets, and on the sands, among the brown-sailed fishing-boats, where many a good picture can be secured.

Leyden, one of the oldest and most historically celebrated towns of Holland, was our next halting-place, being only a short distance from The Hague, and easily accessible by rail. Leyden still retains abundant traces of its ancient picturesqueness in the queer architecture of its buildings, and the decorations which enrich them. There is much left to admire and much to interest the photographer in this quaint old town. Undoubtedly the finest building in Leyden is the grand town-hall, which stands in Breede Straat, the principal street of the town. This grey time-worn building, with its elaborately carved doorways and gables, high-pitched roofs, and dark open-work spire, is a splendid specimen of sixteenth-century Dutch architecture. In the centre of the façade is the principal entrance, which, being some distance above the level of the street, is reached by a double flight of stone steps, the balustrades of which are decorated with lions supporting shields, emblazoned with the arms of the city. The edifice dates from the year of the memorable siege of Leyden by the Spaniards, 1574; and on a tablet over one of the doorways is this commemorative inscription in Dutch: "When the black famine had brought to the death nearly six thousand persons, then God the Lord repented of it, and gave us bread again as much as we could wish." On a tree-covered mound, nearly in the centre of the town, rise the walls of the oldest building in Leyden,—the Burg. It is a low circular tower, with deep embrasures around the top ; and it was from this tower the movements of the Spaniards were so eagerly watched by the famine-stricken citizens during the siege. Owing to its peculiar position, I think it is impossible to photograph the Burg successfully ; but you can get several good views of the town from various points of the mound. I may add, by the way, that the Burg is now enclosed in the gardens belonging to the Burg Hotel, the proprietor making a small charge for admission, about twopence, as far as I can remember. Close to the Burg is the Church of St. Pancras, or, as the natives call it, the Hooglandsche Kerk, a rather uninteresting Gothic structure, scarcely worth photographing. Going towards the town from the station, on your left is seen a huge windmill, towering conspicuously above a mass of trees which line the banks of a small canal. 'Tis, I think, well worth a plate, if the mill is not in motion.

Haarlem is easily reached by rail from Leyden, and should on no account be missed, as there is a great deal that is worth photographing in and around the town. In common with the majority of Dutch towns, the chief buildings are found clustered in the market-place,—a broad, open space in the centre of the town. Here stands the ancient, weather-stained Groote Kerk of St. Bavon, whose massive walls enshrine the world-famed Haarlem organ. We were fortunate in being present at a recital on this beautiful instrument, having arranged our visit to Haarlem for Tuesday. Each week on that day, and also on Thursday, there is a free public recital, which music-lovers should not fail to hear. The organ-case, which occupies the whole west end of the nave, is worth photographing, being handsome and imposing ; as is also the elaborately carved choir-screen. Long exposures would not be necessary, as the church is very well lit. Close by the side of the church, and almost overshadowed by it, is a queer-looking edifice, with grand dormer windows along one side.

This building is the old Flesh Hall, and has a curious step-gabled front, Renaissance in style, decorated with much carved stonework. At the opposite end of the market-place to the Groote Kerk is the town-hall, a quaint, old building, dated 1633, with high-pitched roof and old-fashioned leaded windows, looking a deal more Flemish than Dutch with its funny little balcony over the door. On the eastern outskirts of the town there is a perfect specimen of Dutch mediæval architecture,—the Amsterdam Poort, one of the old city gates. Its ancient walls—crumbling, alas! under the hand of time—conjure up a vision of mail-clad warriors and stalwart men-at-arms guarding its portals. But the spell is soon broken, the vision is but momentary; for through the gateway comes Mynheer,—not the Mynheer van Dunk of tradition, but an every-day Dutchman, with silk hat and umbrella. Horrible! Let us keep *him* at least out of our picture.

Amsterdam, which is within an hour's railway ride from Haarlem, was our next halting-place; but, in accordance with the original intention, I will not attempt a description of this "Venice of Holland." Yet I cannot leave Amsterdam without mentioning a small town about six miles away,—Zaandam,—a beautiful little place. Steamers run to and fro from the Wester Dok, Amsterdam, about every hour; and on a fine day 'tis a delightful excursion to this veritable paradise for photographers. Some of the smaller canals are lovely, overhung with such wonderful old tumble-down wooden houses, that it appears little short of miraculous they do not topple over headlong into the water. The great locks at Schellingwowde are also worth a visit. Here, across the River Y, a huge dam with five locks has been constructed, to protect the North Sea Canal from the Zuyder Zee. Some idea of their great size may be gained by my mentioning that when there I saw an ironclad belonging to the Dutch Navy passing through one of them.

After exhausting the attractions of Amsterdam and its neighbourhood, North Holland, with its dead cities of the Zuyder Zee, attracted us; and of these we found Hoorn to be one of the most typical and characteristic, being the ancient capital. The most pleasant way of getting there from Amsterdam is by steamer, which leaves the Wester Dok every morning at ten o'clock. The trip up the Zuyder Zee usually takes about three hours, and is a very enjoyable one if the weather be favourable. If it is not, or you are a bad sailor, there is the railway as an alternative route. After leaving the dock, we steam rapidly up the broad River Y, among crowds of small craft scurrying in all directions, till we arrive at the locks at Schellingwowde. Where, after a tremendous amount of shouting and exertion on the part of the lock-keepers, the boat glides out on to the broad yellow bosom of the Zuyder Zee, which lies spread out before us, sparkling and dancing in the sunlight. As the steamer rapidly ploughs her way along the eastern shore, Broek, the first of the dead cities, is descried. Then Edam, one of the centres of the cheese trade, is seen ; and further on is Monnickendam, with its anchovy market. Then, seeming apparently to be rising out of the water, we see the Island of Marken, with a host of tan-sailed fishing-boats anchored under its lee. Leaving Marken on our left, we presently pass close by one of the fishing-boats, laden with fish for the Amsterdam market. Running before a stiff breeze, she plunges heavily through the waves, sending showers of spray flying over her blunt-bows, drenching her crew (a man and a boy), who seem rather to enjoy their wetting than otherwise. Right away on the horizon, where the cool grey sky and the yellow sea imperceptibly melt into one, a church-tower can be distinguished. That is Hoorn, so we are told ; and as we draw nearer we can make out the Water Gate, still, as of old, keeping a silent watch over the little harbour. No grim cannon peep out of its lichen-covered embrasures now ; like an old watch-dog long past service, it is harmless, but noble in decay. Passing through the harbour flood-gates, the steamer moors alongside an old quay, and we step ashore in Hoorn,—" Hoorn the blessed," as the national poet Vondel fondly names it. A quaint, old-world air pervades the town, promising great things from an artistic point of view ; and pictures crop up at every turn. Figures ? Yes, look at yonder knot of fisherfolk lounging on the quay, the men clad in a strange-looking costume, and the women scarcely less picturesque. The men's broad shoulders are clothed with short jackets; their legs with tremendously expansive knickerbockers, fastened with great silver buttons, larger than crown-pieces, and laced at the waist-band with bright-coloured ribbon. Small low-crowned hats with narrow brims surmount their bronzed and weather-beaten faces; and clumsy wooden shoes complete their unique costume, serving as a foil to the lace caps, short petticoats, and silver-buckled shoes which adorn the women folk. Architecture? Look down that street. No two houses are alike in height or shape. Some slope forward, looking as if they would topple over; whilst others of a modest and retiring disposition slope backward, shrinking from their bolder brethren. None stand at the same angle; yet all are unanimous in having a rooted objection to remaining in a perpendicular position. The most charming building in Hoorn is certainly the old Water Gate, standing at the entrance of the harbour,—a curiously planned structure, having a flat façade on the landward side; but presenting a semi-circular front, pierced with loopholes and embrasures, to the Zuyder Zee. Crowning the building is a beautifully proportioned clock-tower; differing, however, from the lower portion of the fabric, having been added at a later period to the original building, which is dated 1532. The tower is Renaissance in style; whilst the lower portion, which is thought to be older than the date inscribed on it, is Gothic; yet, strangely, the two blend perfectly, and no sense of incongruity being apparent. One other only of the six gates Hoorn once possessed, remains,—the East Gate. The gateway has been restored; but the original gates, which are of great thickness and solidity, still hang idly rusting on their hinges. Architecturally the inner or town side is more elaborate than the outer; and carved on the frieze is the Latin version of the text: "Except the Lord keepeth the city, the watchman waketh but in vain." Another quaint building is the Weigh House, in the market-place, with its high-pitched roof studded with queer little dormers;

but, unfortunately, a cast-iron verandah, which has been recently added, spoils in a measure the original proportions of the building. It is worth inspection internally to see the great scales, which are suspended from carved wooden beams. Opposite the Weigh House is a house with a curious step-gabled front, ornamented with lions supporting shields. This front is much higher than the roof behind, and is held up at the back in a very shoddy manner by a network of iron rods. The Stadhuis is a picturesque red-brick building, the front being funnily set at an obtuse angle with the roof,—a method seemingly much in vogue among the architects of Hoorn. This curious setting is very noticeable too in the St. Jan's Gast-huis, close by; on which even the perpendicular mouldings round the door are worked on the skew. The building is now used as an arsenal, and has on its front some fine cut brickwork and carved angle stones. The principal features of Hoorn are but roughly noted, but the whole place is full of interest; and the photographer might well spend several days wandering among its quaint buildings and people. No railway is available between Hoorn and Alkmaar, but a small diligence plies between the two places, and is a pleasant and convenient way of getting there. The road for the first half-dozen miles is exceedingly pretty, and passes through one or two little villages of trimly thatched, gaily painted houses, all uniformly clean and neat. This mania for cleanliness reaches such an extreme here, that the inhabitants even paint the trunks of the trees which surround their houses. Sky blue seems a favourite colour for this purpose; and, in combination with green, it decorates the houses. The diligence which rumbles over the brick-paved roads, lined with fragrant lime trees, and presently turns off alongside a broad canal, which it persistently follows till the towers of Alkmaar are seen sharply defined against the sky, warning us that our ride is all but over, much to our regret.

Alkmaar is a much more modern-looking town than Hoorn, and is the great centre of the cheese industry of Holland, on Friday King Cheese reigning supreme. Being market-day, he is everywhere, and his odour permeates everything. Over five thousand tons of cheese are weighed annually in the scales under the tall Weigh House in the market-place, which, in spite of recent restoration, is still a beautiful building, with lofty gables and spire towering proudly above the surrounding houses. The church of St. Lawrence is a fine Gothic structure, standing at one end of the chief street, Laange Straat, in which also is the beautiful and carefully restored Stad-huis. This, too, is a fine Gothic building, fronted with a double flight of stone steps, and adorned with a graceful spire. There is a good picture to be taken here, looking down the street towards the church, the Stad-huis to the left, a perspective of quaint houses, and in the distance, the Gothic traceries and curious spire of the church. Leaving Alkmaar by steamer for Amsterdam, we reluctantly turn our faces homeward, feeling our pleasant holiday is nearly at an end. Rotterdam is reached next morning by train from Amsterdam, in ample time to catch the English boat; and, as we glide swiftly down the Maas, taking a farewell look at Holland, we feel thoroughly satisfied with our trip.

A few hints in conclusion as to "kit." A wide-angle lens is in many cases almost a necessity, as most of the streets in the Dutch towns are narrow, so that without a wide angle you at times feel at a loss. Take a firm, substantial tripod; for when the wind blows in Holland, it blows with a vengeance, and woe to the unlucky wight with the lightly built, flimsy stand, so much in vogue at present! A *delicious softness* will result. No difficulty need be apprehended on the score of changing plates. The bedrooms can usually be made sufficiently light-tight at night to charge the slides, especially as nearly all the beds are curtained round. Exposures required are about the same as for a similar subject in England, and with a little care you can return with a collection of interesting photographs, which will amply repay you for any trifling inconveniences you may have suffered in Holland with a Camera.

EDWIN H. JEFFREY.

COMPOSITION.

IT is a hopeful sign for photography that its professors are beginning to think and talk of art and artistic rules, and that efforts are being made to produce more artistic results than have hitherto been attained. In the following paper we propose to explain briefly the principal rules of composition, which have been defined by Mr. Prout as "the grouping and arrangement of pictorial materials to express the unity of an entire expression;" and by Mr. Ruskin, in "Modern Painters," vol. v., as "the law of help,—the help of everything in the picture by everything else."

The best definition of composition that we have met with is also by Mr. Ruskin, in his "Elements of Drawing," which is as follows: "Composition means literally and simply putting several things together so as to make one thing out of them, the nature and the goodness of which they all have a share in producing. Thus a musician composes an air by putting notes together in certain relations; a poet composes a poem by putting thoughts and words in pleasant order; and a painter a picture by putting thoughts, forms, and colours in pleasant order." The result of good composition is unity, and is the direct reflection of the genius of the painter, the poet, or the musician on his finished work.

Now composition can no more be taught than the art of painting a Turner picture, or composing a Beethoven sonata; but, nevertheless, as rules of composition are generalisations from the works of great artists, these works, on examination, will be found to conform to certain well-known rules. There are, however, certain simple arrangements and combinations which should be thoroughly known, and which will materially assist the student. It must not, however, be supposed that every picture will contain examples of all the rules of composition, or that in the works of the great masters any rule will be too prominently forced into notice; the object of art is rather to hide the means by which the effect is produced.

The first great rule may be thus expressed :—

I. *Every picture must have one feature more important than the others, which must group with it in subordinate positions.*

This is called the law of *principality,* and is exemplified by having some idea, group, light, or mass of colour more prominent than all the rest, and ruling the others into subjection. The greatest care, however, will be necessary, in applying this or any other so-called rule of composition, not to make it too prominent; it should be suggested rather than insisted on, or the modesty of nature will be overstepped.

II. *Every principal idea, group, or combination should be repeated by some subordinate idea, group, or combination.*

This is called the law of *repetition,* and by it unity is expressed, one passage faintly echoing another. The repetition must, however, always be an echo merely; otherwise it will be difficult to decide which is the principal group, and the desired effect will not be produced. This repetition, if skilfully effected, will express repose. Reflections in calm water will illustrate this rule. If the groups or ideas are too much alike, the effect of symmetry will be produced, which Nature always avoids.

III. *A number of objects, more or less similar, should be represented in orderly succession.*

This is called the law of *continuity,* and may be illustrated by the arches or pillars of a cathedral retiring in perspective, or by clouds or mountain-ranges retiring in appointed order. Turner was very fond of the retiring arches of bridges, and made great use of this law of continuity; see his Rivers of France for examples of this.

IV. *Objects in continuity should, if possible, be in curves, rather than in straight or angular lines.*

It should be noticed that all natural curves are very subtle, and do not form any part of a circle. Graceful curves are also varied and modulated by numbers of subordinate curves; in fact, the beauty of all lines and colours depends in great measure on their delicate and subtle modulations. Examples of beautiful curves may be seen in nets at sea, or the lines of bays and river banks, and the flight of birds and the form of their wings.

V. *There are two kinds of harmonious lines in composition—viz., parallel opposing or intersecting lines, and lines radiating from or converging to some centre.*

Both these kinds of lines are seen in good compositions and in Nature. Trees and shrubs radiating from one root are a striking example of the second class; and it will be found that in most cases there is a mathematical centre of curvature of the branches, which regulates the shape of the whole tree.

VI. *Every colour, line, or form may be made more striking to the eye by the juxtaposition of an opponent colour, line, or form.*

This is the law of *contrast*, and is one of the most important laws of composition. The mind enjoys everything more by dwelling also on its opposite; thus warm colours are set off by cold colours, light by darkness, curved forms by straight, and so on. The combination of these contrasts in a picture requires the greatest knowledge and feeling; a too violent contrast defeats itself, and is the mark of bad work. Great painters, delicate in this as in all else, "do not commonly admit violent contrasts; they introduce it by stealth, and with intermediate links of tender change." Contrast is one of the most powerful weapons the artist possesses, as by it he may bring all the parts of his picture into harmony and proper relation,—some parts, for instance, he will leave purposely uninteresting, so as to enhance the interest of some other part; and the same with finish. This appears to be one of the stumbling-blocks of the extreme realistic or pre-Raphaelite school, and their labour is in a great measure lost, as it is equally expended on every object in the picture. A good painter will know when to stop his hand, and give the spectator a change to some other kind of pleasure; as Mr. Ruskin beautifully puts it, "He gives a passage of rich, involved, exquisitely wrought colour, and then passes away into slight, pale, and simple colour; he paints for a minute or two with intense decision, and then suddenly becomes, as the spectator thinks, slovenly. But he is not slovenly; you could not have taken any more decision from him just then, you have had as much as is good for you. He paints over a great space of his picture forms of the most rounded and melting tenderness, and suddenly, as you think by a freak, gives you a bit as jagged and sharp as a leafless blackthorn."

This law of contrast is perpetually varied and modulated by another law, called the law of *interchange*, which gives to opposite things a portion of the character of the others, and by this the contrast is prevented being too startling or prominent. In Nature it may be continually noticed how the darkest shade is flecked with light, and the brightest light broken up with points of shade. But in good compositions there is an appointed order in this, as in all else; the result to be produced is unity and harmony; and as every star burns in its appointed order, and every blade of grass springs in its appointed place, each in harmony with each, and in subjection to the whole, and that whole the perfect composition of this universe, so in the work of a great painter each line and colour falls predetermined into its appointed place, completing and compelling the unity and beauty of the whole. There are doubtless many other subordinate rules of composition, but those above mentioned are the leading principles, which the student will do well to bear in mind, and endeavour to employ in his own pictures, and to trace out in the works of the great masters.

As the hand gains power and the eye delicacy, they will compose naturally without effort, just as a poet or a musician does; for the refined taste and educated eye will not endure harsh forms, or glaring contrasts, or crude compositions.

After all said and done, the subject is one beset with difficulties, and affords the widest scope for difference of opinion. Sir Joshua Reynolds, whose lectures contain a mine of wealth, makes the following remark on this subject: "Composition, taken generally, is the principal part of invention, and is by far the greatest difficulty the artist has to encounter. Every man that can paint at all can execute individual parts, but to keep those parts in a due subordination as relative to a whole requires a comprehensive view of the art that more strongly implies genius than perhaps any other quality whatever."

Another writer on art, Mr. Prout, in his valuable work on "Light and Shade," gives the following brief but comprehensive rule for composition: "The best practice is to form one broad mass, to keep other masses quite subordinate, and to avoid equal quantities."

As a general rule, it is well to avoid one object placed over another, or seen through another; and in sketching from Nature time is well spent in trying for the best possible composition, and the more advanced the artist is the more difficult he will find it to be satisfied. Practice alone will show how the straight lines of mountains and plains may be opposed to rolling clouds and rounded masses broken up by angular rocks and other forms. The sky should always be treated with a view to the composition of the picture. For instance, if the subject is a very full one, and contains much action, a quiet sky will be required; but if the landscape is flat and somewhat uninteresting, then the sky should be made more prominent. The introduction of groups of figures and cattle, flocks of birds, etc., may greatly help the composition; also roads leading into the picture and shadows of clouds passing over the landscape or across a road are most valuable assistants.

The study of the works of great painters of all schools will be of the greatest service to the artist; and among the modern painters of landscape we would especially advocate the close study of Turner, in whose works, and especially in the Liber Studiorum and his other engraved works, all the principles of composition will be found fully illustrated in a way and with a variety no artist has ever attempted.

The study of these masterpieces, and also of the writings of Reynolds, Burnet, Prout, Ruskin, and others on the subject, will be of the most material value to the thoughtful worker, and will fill the mind with noble images, reflections of the Eternal intelligence, which will be, if rightly used, amongst its dearest possessions.

J. ANDREWS.

THE SAD DOWNWARD CAREER OF MR. JOHN SMITH.

IN placing before the public certain details of a man's life, it is usual not to give the man's name, especially if the details before mentioned can hardly be set down to his credit. But where a great moral lesson is to be taught, I think it always advisable to give the correct name if possible, so that others may see that the story is true, and take warning from a career that has been shipwrecked on rocks which, if properly pointed out, they may avoid. In this instance I have the permission of the man's relatives to give his true name; and I think, as a rule, you will find that a person's relatives are always willing to give his name if the incidents to be recorded are discreditable to him. Our dear friends are always the first to recognise our faults, bless 'em! —that is, bless the friends of course, not the faults.

The name of this man whose sad career I have to depict was Smith, and his first name was John. Of course the friends and relatives of Mr. John Smith have long been aware of the facts which I have to relate; and so, as Mr. Smith himself said to me the other day, "It doesn't much matter whether the general public knows the particulars or not." I got Mr. Smith's permission to use his name by giving him a shilling, which I strongly advised him to spend in food. He laughed hoarsely at this advice, and I saw him slink away through the crowd, and finally dive into a photographic dealer's shop, where he expended the shilling for a bottle of pyrogallic acid, which bottle he nervously concealed about his person, and then disappeared down the street.

No one would now recognise Mr. John Smith as the dapper clerk he was a few years ago, when he used to come to the City from one of the suburbs every morning, and be in his office promptly at nine o'clock. Mr. John Smith at that time was a model young man, the pride of his parents, and a man who was recognised by his fellow-clerks as one sure to rise. He was a young man of the most irreproachable habits, which is saying a great deal for a City person. He was temperate in all his tastes, and he did not speculate, which, when you come to think of it, is saying still more for a City person.

One day a friend (Jones) said to him,—

"Smith, what are you going to do with your next half Saturday?"

"Oh, I don't know," said Smith carelessly; "probably go up the river."

"Don't do it. Come with me out in the country. I've got a camera, and we'll take some photographs."

"Oh, but," answered Smith, "I don't know anything at all about photography."

"You don't need to," replied the other, who was a careless, good-natured kind of a person. Jones thought because he could be moderate in photography that everybody else had a like self-control. "All you have to do is to stand as I show you how to stand, and I will photograph you with various backgrounds, and give you some of the pictures."

"All right," answered Smith; "I don't mind if I do."

"Very well," said Jones; "be at Fenchurch Street Station as soon after two o'clock on Saturday afternoon as you can be."

And Smith was there. Together they went out Epping Forest way, and Jones set up his camera, dived his head under the black cloth, waved his hand for Smith to stand this side or that, and thus numerous photographs were taken, with various picturesque backgrounds, and the invariable Smith in different attidudes in the foreground.

Smith showed some little interest in the art of photography, and once put his head under the black cloth.

"By Jove!" he cried, with the air of a man who had made a startling discovery, "this blooming thing's upside-down. To look at this picture makes a fellow feel as if he was standing on his head."

"Oh yes," said Jones, "it's always that way, you know."

"Well, it doesn't surely need to be always that way," replied Smith; "why don't you turn the camera over, and have the picture right side up."

At this Jones laughed somewhat, and explained to Smith the idiosyncrasies of a landscape lens. Smith was very much interested, and at last Jones said to him,—

"I say, Smith, why don't you go in for photography? Get a small camera to start with, and you'll find it awfully jolly during your holidays. It doesn't cost much either, and is very simple to learn. I'll show you all there is about it."

Smith said that he thought he couldn't afford a camera.

"Well, I've got a little $\frac{1}{4}$-plate camera I'll let you have. I don't use it. I'll lend it to you for as long as you want it, and it's always better to start with a small camera, anyhow."

Smith said he would think about it, and there the matter ended. He thought very little of photography until one morning he got a package of photographs from Jones, all nicely mounted, with himself in the foreground of each picture. He took that home, and showed the pictures to his mother and sisters, and they all agreed that they were very nice. Of course they knew nothing whatever about photography, and little thought that before long the young man would be a victim of it.

John Smith called on Jones at his residence to thank him for the pictures, and then the latter brought out from a cupboard the different parts of a $\frac{1}{4}$-plate outfit, which he proceeded to put together and stand in a three-legged way on the floor of the room in which they were.

"There," he said, "Smith, you are quite welcome to this. You take it along for a while; it isn't a very good outfit, but it'll do you as a starter. Afterwards, when you get to "know the ropes," you will probably have your own preference as to a camera, and can then suit yourself."

Smith at the time thought this was kindness on the part of Jones; and doubtless Jones himself thought that he was a good-natured person who was acting in a good-natured way to a fellow-creature. Had there been, at this time, somebody to whisper a kindly word of warning to young John Smith, how different might have been the result! But there was no one to whisper the word.

This story is sad enough without having any exceptional gloom added to it by me; and it would be an exaggeration to say that Smith at once became irretrievably addicted to photography. He did not. It was a gradual process. He took the camera out on a Saturday half-holiday, and then developed his plates in a room he had fitted up for that purpose. But he did not take it out every Saturday, nor did he relinquish his boating, or many of his usual habits. If he thought about the matter at all, he thought that he could at any time give it up; that all he had to do was to send back the borrowed camera to Jones, and there would be an end of it. If anybody had told him that he was becoming a confirmed amateur photographer, he would have laughed at the idea. None of his friends noticed any difference in him, and his employer still thought him a model young man—as, indeed, with the exception of the one growing vice, he was.

But by-and-by he began to think about his camera during business hours. As he sat on his high stool in the somewhat sombre room in the City, little bits of pretty landscape would come up before his eye, and he yearned to be away in the green fields, or beside the streams, or among the rocks and woods with his camera. He now spent nearly every Saturday away with the little instrument, and he gave up his usual Sunday avocations to print the pictures he had made, which everybody admitted were about as bad as they possibly could be. Nevertheless, he improved, and one day he joined a Photographic Society in his neighbourhood, composed mostly of reckless young fellows, who saw no harm in photography, and who would have laughed to scorn any one who had warned them of their danger. These people met once a week, and often listened to papers read by fellow-members on "New Developers," and on the "Mental Aberration of Lenses," and on "Hydroquinone as a Useful Stimulant," and all that sort of thing. Wild bacchanalian smoking concerts were held by the club, where the air was blue, and songs were sang, and glasses which did not contain an authorised developer were emptied. These young fellows during the summer were in the habit of going off on dissipated photographic revels, meeting at the station, and going out to parts of the country unprotected by the police, where they descended each one armed with his camera, and photographed things right and left without regard to the consequences.

Smith joined these bacchanalian tours; and I regret to have to say that he liked them. By-and-by he gave Jones back his camera, but not with the intention of making an effort to reform. Far otherwise. He had gone and purchased a ½-plate instrument, and this he told to Jones with apparent pride.

"That's the way fellows generally act," said Jones. "They are rarely contented with a ¼-plate, and I hope you have got a good instrument."

You see the young man was not among people who could give him a word of warning. If he had had any friend who would have said to him: "My dear sir, you commence with a ¼-plate, and at first the ¼-plate satisfies you; but after a while you yearn for a larger dose, and go in for a ½-plate; so don't you see that by-and-by you'll go in for a whole-plate, and then an 8 by 10, and perhaps a 10 by 12? Think, my young friend. Pause for a moment, and consider where you will bring up. Consider the hold it is getting upon you. Consider that it takes larger and larger plates to satisfy your craving for them. Break it off while there is yet time." But there was no one to say these words, and Smith went on his career unchecked. If, therefore, these remarks of mine reach the eye of some young man, at present respectable, but having still yearnings towards photography, let him think seriously and ask himself what is to be thought of a vice that begins with a ¼-plate and ends—who knows where?

One would have thought that Smith's own people would begin to take notice of his general change of conduct. One would have thought that his mother would have asked herself, "Where is my boy spending his nights?"

Time was when he played a friendly game of cards or of chess with his people; time was when he met his friends down at a City club, and played an innocent game of poker with the stakes limited; time was when his aspirations led him to believe that some time he might find himself seated among highly moral people around a baccarat table; but, alas! all these aspirations were now gone, and his mind was wholly taken up with photography. His nights were spent in a dark-room, surrounded by bottles that glittered ominously in the fiendish red light which pervaded the unventilated apartment. With trembling hand and with a graduated glass raised up against this demon light, if a person could now have seen John Smith, he would have seen him pouring from a bottle labelled No. 1 so many ounces of fluid, and from a bottle labelled No. 2 so many more ounces, and then from a dropping bottle so many drops, until the glass with the developer was filled to its highest mark.

This was how John Smith was spending his nights; but he took care that no one saw what he was at, for he locked the door firmly behind him, and he arranged the room so that not a chance was visible for the most inquisitive eye to peer in at his nefarious work.

It was his kind-hearted employer who first realised his change of conduct. It was old Mr. Robinson who noticed his restless eye, heated with the red light of his midnight avocation.

"John," said Mr. Robinson, placing his hand kindly on the young man's shoulder, "how do you spend your evenings?"

John started, and his once direct look evaded the searching eye of his employer. Then he began to shuffle. "Sometimes I am doing one thing, sometimes another," he said.

"Tell me, John," continued his employer, "what you were doing last night. Your face is haggard, your eye is restless, and bloodshot. I noticed you poured the ink from the large bottle into the small one, as if you were measuring it. What were you doing last night?"

John was silent, but finally he said in a low voice, "I was developing pictures."

"Ah!" said his employer, "I feared as much. I saw a photograph on your desk the other day, so badly taken that I knew an amateur had done it. I feared that amateur was you. Now, John, take the warning of an old man, and brace up while it is yet time. You can stop it if you only think so. Promise me that after this you will never look upon the developer when it is red."

"When it is very red," said John evasively, "it is next to useless, and when it turns black it is no good at all."

"Very likely, very likely," said the old man. "I don't pretend to be familiar with those things; but promise me that you will stop it."

"Well," said John, "I will promise you to photograph more in moderation in future."

"Ah!" exclaimed the old gentleman bitterly, shaking his head, "moderation is the rock that many a young man has split on. Moderate photography soon leads to immoderate photography. Drop it altogether, John. Promise me that you will." And John with a sigh made his promise, and really at that time intended to keep it.

Perhaps he might have been able to have kept his promise if it had not been for the numerous photographic dealers' shops that line our principal thoroughfares with gaudy and enticing wares. No one but a hardened photographer knows how difficult these shops are to pass. John Smith felt the danger of lingering before their windows, and resisted hard the temptation to enter and ask for a price list; but one day in a window he saw a glaring announcement of a new developer, with the intimation that one-ounce samples were given away on trial. He hesitated and was lost. He went in and got a sample of the new poison. He said to himself that he had just three plates still undeveloped, and that it wouldn't do any harm to try the new developer upon them. But, unfortunately, as too often happens, his passion for photography came upon him with increased violence, and that sample ended in a wild photographic debauch, during which he was absent from his office three days in the country photographing the upper reaches of the Thames. When he reached his office he found another in his place.

"You have broken your word," said old Mr. Robinson; "if you can also break your habit, come back to me, and I'll see what I can do for you."

The young man laughed wildly and left the premises.

There is no use in dwelling longer upon the career of Mr. John Smith. Every one knows just what happened, because it is the inevitable that always happens. The pleadings of his family were in vain. The advice of friends was laughed to scorn. Every penny of money that he could beg or borrow he spent in developers and plates. He would pawn his last shirt for a glass of hydroquinone and water. That he will ever reform even his most intimate friends do not believe, because the Salvation Army has not yet taken up this branch of human depravity. But let it be a lesson to those who glibly offer advice to young fellows on photography, and start them on a $\frac{1}{4}$-plate career that may have a 10 by 12 ending.

LUKE SHARP.

THE OPTICAL LANTERN AS AN AID IN TEACHING.

THE LANTERN, AND MANIPULATION OF IT.

IN a former article* the method of arranging a lantern and screen in the manner most advantageous for ordinary class purposes, with special reference to the necessity for using the lantern effectively without darkening the room, was described in some detail. In this article it is proposed to describe the forms of lantern most useful for general school work and for demonstrations in technical subjects; to summarise very briefly such principles of construction as must be understood if the instrument is to be used properly; and to explain those points in manipulation which must be attended to in order to secure good results. No attempt will be made, of course, to write a complete treatise on the subject (that, indeed, would require a whole volume), and the article is written mainly with a view to help schoolmasters and teachers of science who have had no experience in lantern manipulation, but who recognise the great utility of this instrument as a means of illustration, and the great part that it is undoubtedly destined to play in education.

The essential parts of the optical lantern are the light, or, as it may conveniently be called (adopting Mr. Lewis Wright's nomenclature), the *radiant*, the *condenser* which collects and concentrates the light, and the *objective* which forms the image. The rest of the instrument consists simply of the casing and supports which enclose these essential parts and keep them in their proper relative positions.

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* PHOTOGRAPHIC QUARTERLY, vol. i., April 1890.

THE OBJECTIVE, if of the short focal distance which alone will be suitable if the lantern is to be worked by the teacher or lecturer himself, must be a doublet or rectilinear lens. That supplied with the cheaper lanterns is usually a photographic lens of the type commonly employed for portraiture, and, as a rule, works very well. Other lenses of similar but not quite the same construction are made specially for lantern purposes, and are better when pictures or complex objects have to be shown as perfectly as possible, but are not really necessary for ordinary class work. A good objective must not only give uniform illumination and good definition all over the disc, but must also have a field as flat as possible, that is to say, the image at the edge of the disc and the image at the centre of the disc must both be sufficiently well defined with the lens in the same position. If this requirement is not satisfied, but the image at the edge is blurred whilst that in the centre is sharply defined, and *vice versâ*, the field of the lens is too round, and it should be exchanged. Further, the lens must be rectilinear, or at any rate must give no perceptible curvature to lines that should be straight, and no perceptible convergence to lines that should be parallel. Both these qualities can be estimated at the same time by putting into the lantern a slide consisting merely of straight lines running horizontally and vertically, great care being taken that the lantern itself is properly adjusted with respect to the screen. An ordinary slide is of little use for the purpose.

The focal length of the objective should be from 4 to 6 inches if the lantern is to be worked by the teacher from his lecture table, but must be very much longer if it is worked by an assistant from the back of the room, and in this latter case a single lens may be used instead of a doublet. The exact focal length required is in every case determined by the size of the disc required and the distance at which the lantern can conveniently be placed from the screen.

The following table gives data sufficient for ordinary class work; the upper horizontal column gives the focal length of the lens *in inches.* The first vertical column gives the diameter of the disc on the screen *in feet,* and the other vertical columns give the distance in feet and inches at which the lens of the lantern must be placed from the screen.

DIAMETER OF DISC.	EQUIVALENT FOCAL LENGTH OF LENS.			
	4	4½	5	6
3 feet.	4 4	4 10	5 5	6 6
4 ,,	5 8	6 4	7 1	8 6
4½ ,,	6 4	7 1	7 11	9 6
5 ,,	7 0	7 10	8 9	10 6
6 ,,	8 4	9 4	10 5	12 6

For example, if the focal length of the lens is 6 inches, and a disc is required 4 feet in diameter, the lens of the lantern should be 8 feet 6 inches from the screen. The distances in the table are supposed to be measured from the optical centre of the lens, which may, with sufficient accuracy, be assumed to be halfway between the two lenses composing the ordinary doublet. For all ordinary purposes, the distance may be measured from the front lens.

The lenses are usually fitted into brass mounts provided with a rack and pinion for fine focussing, and the mounts screw into a draw tube by means of which the coarse focussing is effected. They should be cleaned from time to time by dusting with a camel's hair brush, and rubbing with a soft wash-leather perfectly free from grit. Before being used they should be left for some time in the room in which they are to be used, in order to prevent condensation of moisture on their surface. This can only happen when the lenses are colder than the air in the room.

The Condenser usually consists of two plano-convex lenses mounted in brass cells with their convex surfaces inwards and nearly touching one another. Their diameter is usually 4 or 4¼ inches, and this is best for showing slides, but if apparatus is to be projected it is an advantage to have condensers 5 inches in diameter. The function of the condenser is to collect the diverging beam of light proceeding from the radiant, and convert it into a converging beam which passes through the object into the objective, the latter forming the image (fig. 1). If there were no condenser, only a very small fraction of the light would be utilised in forming the image on the screen. The best relative positions of the radiant, the condenser, the object, and the objective depend on the focal length of the condenser and the objective; they must be so arranged that the converging cone of rays proceeding from the condenser fully illuminates the object without to any great extent passing outside it, and the whole of the cone, whilst still converging, should fall into the objective. Broadly stated, with a given condenser, the further the objective, the nearer the radiant; and *vice versâ* (compare 1 and 2, fig. 1). When projecting the image of apparatus, for example, it is almost always necessary to move the objective further away from the condenser, and then, in order to get the best results, the radiant must be moved nearer to the condenser. The further the lantern is away from the screen, the nearer will the objective be to the condenser when a slide is in focus, and consequently the further

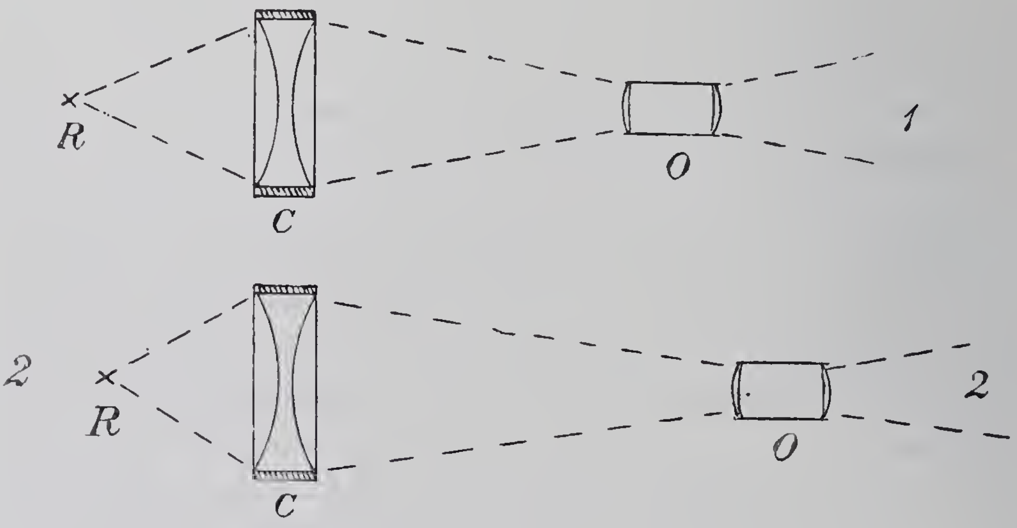

FIG. 1.

must the radiant be from the condenser, and *vice versâ*. After a little experience, the positions giving the best results will be easily and quickly found by trial.

Condensers should be carefully cleaned from time to time in the same way as the objective. When in use they must not be heated too rapidly, or they will most probably crack, the danger of this result being increased if the lenses fit too tightly into the brass mount. The radiant should always be turned up gradually in order that the condenser may be slowly heated. The lantern should be properly ventilated, special provision being made, if possible, for a current of cool air to pass continually over the face of the condenser. When a lime-light is used, care must be taken that the jet is not moved too close up to the condenser, and that the flame is not projected towards the condenser in consequence of pitting of the lime.

The Radiant will be either an oil lamp, or the lime-light with a blow-through or safety jet. The former is troublesome, cannot be used successfully in a room lighted by daylight, and cannot be used at all if it is necessary to tilt the lantern at any considerable angle; the latter is so simple to work now that oxygen can be obtained compressed in bottles, and the results are so much more satisfactory, that its use is to be recommended wherever possible.

Oil Lamps for the optical lantern are now made with two or three wicks, each about two inches broad, placed parallel with one another, and arranged so that their edges are towards the condenser. Sometimes lamps are made with four wicks, but they are much more troublesome to use than lamps with three wicks, and the gain in intensity of light is seldom appreciable. Over the wicks is an arched cover carrying a tall chimney, and the lamp is closed at the end next the condenser by a glass plate, and at the other end by a metal door, in which there is a small sight-hole. The cover is hinged at one end and can be lifted up for the purpose of lighting the wicks, and each wickholder has a toothed pinion by means of which the height of the wick can be regulated.

Considerable care is required in order to get the best possible results from an oil lamp. The wicks, which should not be too tightly woven, are cut into lengths of seven or eight inches, and carefully dried. They are then inserted into the wickholders and carefully trimmed with a sharp pair of scissors, the corners being slightly rounded off. After they have once been properly trimmed and have been used, they should never be touched with scissors ; all that is necessary is to turn the wick up and carefully wipe off the charred portion with a piece of soft paper. The lamp having been filled with oil, should be allowed to stand for a short time before being lighted, in order that the wicks may become properly saturated with oil. It is important to remember that when the wicks are burning they should never be turned more than half down ; if the flame is very low the wick chars to a considerable depth, and when the wick is turned up again the illuminating power of the flame is very poor.

Only the best paraffin oil or petroleum should be used ; the cheaper and more volatile oils with a low flashing point are dangerous. The ordinary lamps hold about a pint of oil, and it is convenient to have a glass bottle holding about a pint, with a mark upon it showing the quantity of oil that fills the lamp. After use the oil is emptied from the lamp back into this bottle, which is then filled to the mark from the stock can, and when the lamp has to be used again the whole contents of the bottle can be emptied into it with the knowledge that the lamp will then be properly filled.

One of the great drawbacks to the use of oil lamps is their tendency to produce a disagreeable smell, but this can be almost entirely prevented by the exercise of a little care. The lamp should be kept scrupulously clean, and care must be taken not to allow any fragments of charred wick to lodge in the wickholders. Before use the body of the lamp and the wickholders should be very carefully wiped with a dry cloth in order to remove the thin film of oil which spreads over the surface and is one of the chief sources of the smell. This film of oil arises mainly from leakage through the joints of the pinions in the wick-holders, and with a view to prevent this as far as possible, the reservoir should always be completely emptied of oil after use and before the lamp is put away.

The Lime-light, oxy-hydrogen light, or oxy-calcium light is produced by blowing a jet of oxygen gas under small pressure through a flame of coal gas, hydrogen, or alcohol, and allowing the non-luminous flame thus produced to impinge on a piece of lime, which thereby becomes intensely heated and emits a very brilliant light. When very brilliant illumination is required the two gases are allowed to mix before they issue from the jet, but for all ordinary purposes the safety or blow-through jet is amply sufficient, and it is much easier to work. The blow-through jet usually has one of the forms shown in fig. 2—the outer tube conveying the coal gas whilst the inner tube conveys the oxygen. The two gases meet only at the mouth of the jet, the arrangement of the tubes and taps, with the socket for supporting the jet, being shown in fig. 3. It is essential that the tubes carrying the supply of the gases should be fitted to the proper taps, and if they are not already marked, the oxygen tap should be distinguished from the other by nicking the edge in two or three places with a file.

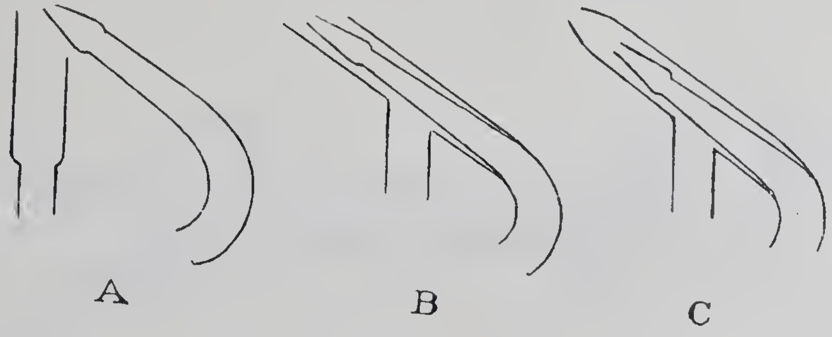

Fig. 2.

The illuminating power of the jets is affected very considerably by the relative diameters and positions of the two tubes, and varies greatly in different jets. Some time ago the author made careful photometric comparison of a large number of jets from various sources, and three jets of pattern A (fig. 2), made by Newton & Co., were found to be the best. The form B is the most common, and very good jets of this kind can be obtained; but many of them are very wasteful in their consumption of oxygen, and they should always, if possible, be tried before being purchased.

The lime cylinder is supported on a pin (fig. 3), which should be provided with a cog-wheel arrangement for rotating the lime, this being worked by means of a rod extending outside the lantern. Sometimes the lime-pin and cog-wheels slide backwards and forwards, so that the distance between the lime and the jet can be adjusted, the support, etc., being clamped by the screw C. In other cases the lime-pin has no slide motion, the best position having been determined by the maker.

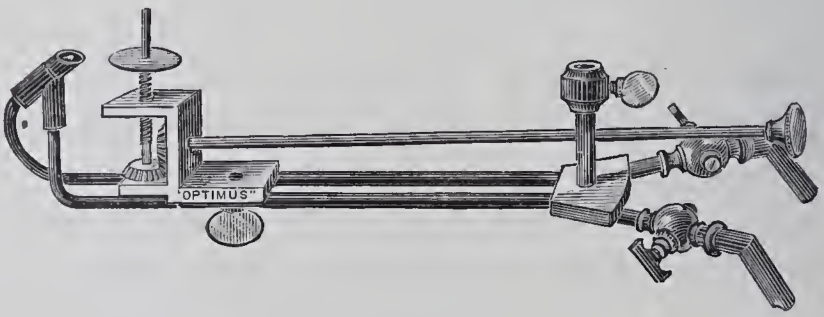

Fig. 3.

The limes are in the form of cylinders, which should be as accurately turned as possible, and have a central hole through which the lime-pin passes. This hole is usually filled with lime-dust, and must be cleaned out with a wire or a rat-tail file. The limes sold are known as "hard," "soft," and "Excelsior"; they all give good results with a blow-through jet, but the soft and Excelsior limes are considered to be slightly better for this purpose than hard limes. It is absolutely necessary that the limes should be protected from air and moisture. They are usually packed in tins with lime-dust, but they are best kept in a wide-mouthed glass bottle fitted with a good india-rubber cork; a brass tube with a screw cap provided with an india-rubber washer is also frequently employed. Before a lime is used it should be thoroughly dried by being baked in an oven for half an hour or so. After use it should be put back into the bottle or brass tube as soon as it has cooled; if left in the lantern it will combine with the moisture in the air, and will crack and become useless.

When the jet is used, the lime is put in position, and the gas flame is lighted and turned up to a height of about an inch and a half, in order that the lime may be gradually heated. After ten or fifteen minutes the gas is turned up, and the oxygen is slowly turned on until it roars. The oxygen is then turned off until the roaring stops, and the hydrogen is adjusted so that there is a slight excess of it, forming a *small* "wing" on either side of the lime. If a Beard regulator is used, the adjustment of the proportion of oxygen is done by means of the ordinary jet tap; but if a Beard regulator is not used, the jet tap *must be left full on*, and the adjustment made by means of the tap on the bottle, a difficult thing to do without a large amount of practice.

If the position of the lime is adjustable, it is slowly moved towards the flame until a black spot appears in the centre of the luminous part, and it is then moved very slowly back until this black spot just disappears, and the lime support is clamped in this position, which will give the maximum illumination. This operation is, of course, done with the jet removed from the lantern. It is very important that the flame should strike the lime cylinder in the centre, so that the illuminated spot is exactly opposite the condenser, and not at the side, for the latter condition not only gives less effective illumination, but may tend to set the lantern on fire by producing a long wing of flame on one side of the lime. If the jet is so badly made that it shows this defect it should be at once rejected. The inside of the nipple of the oxygen jet should be carefully cleaned with a wire from time to time, for any grit in the tube, or jagged edges to the aperture, greatly increase the tendency of the gas to roar.

The jets and tubes are provided with a socket (fig. 3), and this slides on a vertical rod attached to one end of a flat piece of metal or tray which slides horizontally in grooves in the bottom of the lantern. The jet can thus be raised and lowered, or turned about in a horizontal plane, and is clamped with a screw.

THE ALCOHOL JET is of great service in country places where coal-gas cannot be obtained; it gives more light than an oil lamp, but less than a blow-through jet with gas. It consists of a spirit lamp with a circular wick, a jet of oxygen being blown across the flame, which is thus caused to impinge on a lime. A reservoir for the alcohol is outside the lantern, and communicates with the wick by a tube; in other respects the construction and arrangement of the jet is similar to that already described, and the adjustment of the flame is made in very much the same way. Soft limes give the greatest amount of light with this flame.

COMPRESSED OXYGEN is now supplied in steel cylinders which can easily be sent by rail to any part of the country; the apparatus required for use in connection with them is a Beard's small regulator, and a key for opening the cylinder tap. Since the gas is under very high pressure, proper care must be exercised, and the instructions of the manufacturers must be carefully followed. Care must be taken that no grit gets into the threads of the screws, or into the cones; and when a regulator, valve, etc., is to be screwed on, it must be fitted carefully into the socket without any inclination to one side or another. The screws should be turned until they are quite gas tight, but should not be screwed up too far, for they will then be very difficult to unscrew, and the thread of the screw may even be stripped off. Taps should always be turned on slowly and turned off slowly, in order to avoid great variations in pressure. A simple and efficient way of testing whether a joint is gas tight or not, is to moisten it with a little water, or better, saliva, and observe whether any bubbles of gas make their escape.

In order to ascertain how much gas is left in a bottle, the pressure is measured from time to time with a pressure gauge, and if the capacity of the bottle is known once for all, the quantity of gas remaining is easily calculated. In order to avoid accidents the same gauge should not be used for both oxygen and hydrogen, and the glass face of the instrument should be turned away from the operator until the pressure is full on. The tap should be turned on very slowly, and indeed it is best to turn the cylinder tap until the oxygen escapes slightly before screwing the pressure gauge into its place.

Since a cubic foot of oxygen weighs 1·43 ounce, or 1 ounce of oxygen occupies 0·7 cubic foot, the quantity of gas in a cylinder can be ascertained by carefully weighing it, if the weight of the empty cylinder is known. By weighing it before and after an exhibition, the difference in weight will give the quantity of oxygen used, even though the weight of the empty cylinder is not known.

Compressed coal-gas or hydrogen can also be obtained in bottles, and is a great convenience when an ordinary gas supply is not available. They are used with a Beard regulator in the same way as the oxygen ; it is very important not to put on the hydrogen bottle a regulator which has been used for oxygen, and *vice versâ*.

THE LANTERN itself should be as small in the body as possible, with a view to secure portability, and to avoid obstruction of the view of people seated behind it. Lanterns with Russian iron bodies work well, but become very hot, and it is preferable to have a wooden body with a metal lining, there being a clear space between the wood and the metal in order to secure proper ventilation. When slides have to be shown, a stage or holder for the slide carrier is necessary, and it must bring the slide as close as possible to the condenser. When experiments in tanks have to be performed, the holder or stage must be open at the top (fig. 4); when the image of apparatus has to be projected on the screen, the objective must be capable of being moved to some distance from the condenser, as in what is known as the "Sciopticon" form of lantern. The "Cantilever" lantern of Hume has certain special features, which are clearly shown in the illustration (fig. 5); the front bellows can be removed when apparatus is to be shown, and the horizontal rods support a small stand carrying the apparatus. It cannot, however, without slight alteration, be used advantageously for showing slides, unless fitted with a 4-inch condenser. The Chadwick lantern (fig. 6), though somewhat different in construction, has the same advantage that the bellows can be removed to allow of apparatus being placed between the objective and the condenser, whilst it is equally suitable for showing slides. Sometimes apparatus or experiments must be shown with the apparatus in a horizontal and not a vertical position. The objective is then removed, and the cone of light from the condenser is allowed to fall on a mirror placed in front of it at an angle of 45°. The beam of light is thus sent vertically upwards, passes through the apparatus (which is supported in a convenient manner) and through an objective; it is then received on another mirror at an angle of 45°, and is thus projected on the screen. Messrs. Newton & Co. have devised a double lantern, both parts of

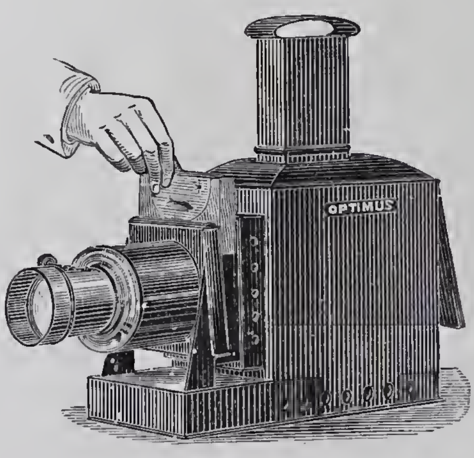

FIG. 4.

which can be used in the ordinary position, or one of them can be turned up vertically, as shown in (fig. 7), for the projection of horizontal objects. A still newer lantern by Stroud & Rendall has been designed to satisfy all ordinary lecture requirements when in use in the ordinary manner a mirror between the condensers is turned out of the way. The jet also has some novel improvements, which make centring easier, whilst at the same time there is less liability of the jet being accidentally displaced after it has once been fixed. There is also a special by-pass tap, which turns down the oxygen and hydrogen together after the proper proportions have been adjusted by means of the ordinary jet taps.

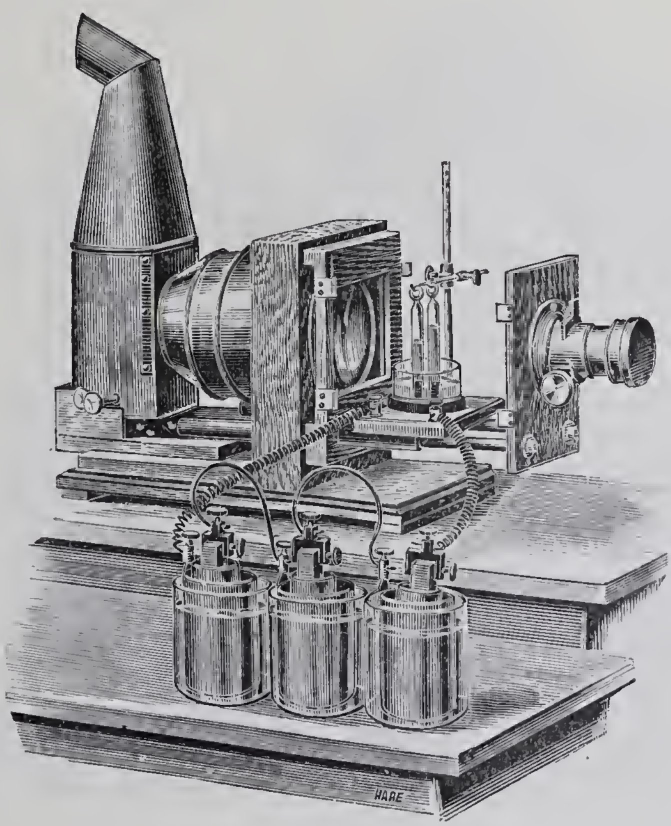

Fig. 5.

The adjustment of the lantern and its parts should be done with some care. The proper distance having been determined (see table), the lantern is placed with its axis exactly at right angles to the screen, and with the objective pointing to the centre of the screen. The jet with a lime is put into position, and the gas is lighted and allowed to remain with a flame at the height of 1½ to 2 inches for a short time in order to warm the condenser of the lantern. The gas is then turned up and the oxygen turned on as already described, and the lime is centred by moving the jet up or down, and to right or left until the circle of light is in the centre of the screen. The tray carrying the jet is now moved nearer to or further from the condenser until the disc on the screen is fully and evenly illuminated. A slide is inserted in the carrier and is focussed first with the draw tube, and afterwards with the rack and pinion on the objective. The slide is then removed, and the tray carrying the jet is again moved backwards or forwards until the best illumination of the disc is obtained. A black patch in the middle of the screen shows that the lime is too near the condenser;

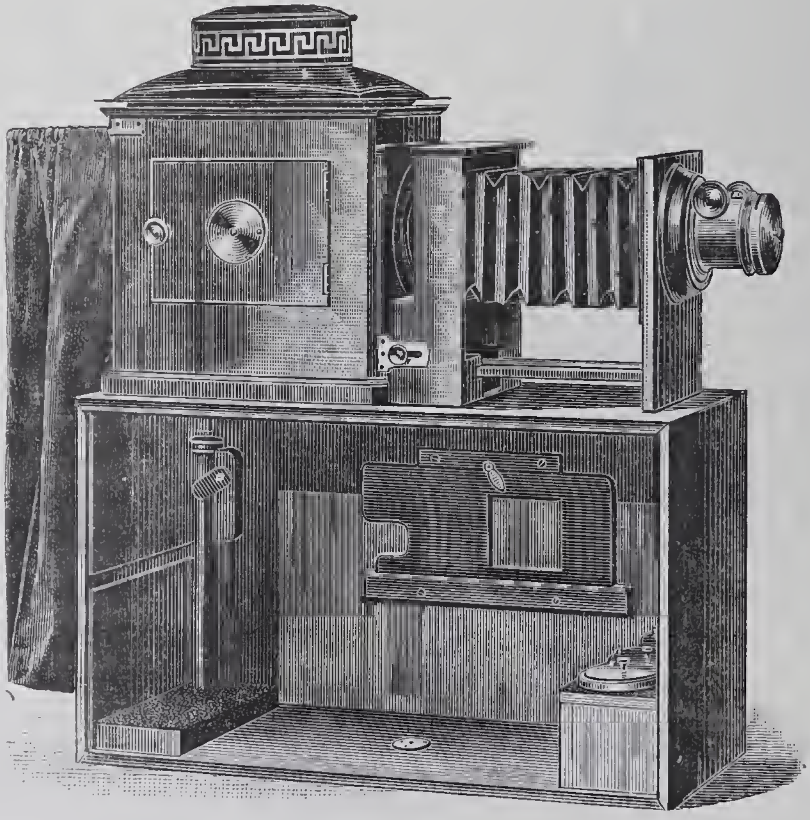
Fig. 6.

want of illumination at the edges of the disc shows that the lime is too far away. A dark patch near the top, bottom, or side of the disc shows that the lime is not properly centred; when making the readjustment, the lime and jet must always be moved in a direction away from the dark patch—*i.e.*, to the right, if the dark patch is on the left; up, if the dark patch is near the bottom.

When the lantern is used for any length of time, it is necessary to turn the lime occasionally in order to prevent the formation of a hole by the continued action of the flame on one spot.

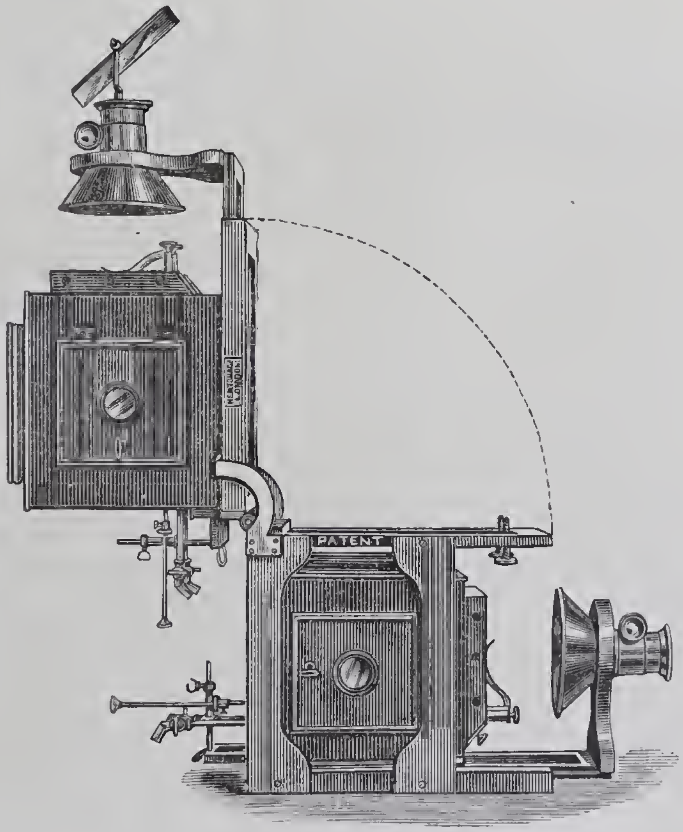

FIG. 7.

Slides are put into the carrier upside down, with their faces towards the condenser. It is advisable to mark them in what is now adopted as the regulation manner. Place the slide in front of you so that the picture is in its correct position as regards top and bottom, right and left. Now put a small circular or square patch of paper on the face of the slide at each of the top corners, or a strip of white paper along the top. The slide will be in its correct position in the camera when the white patches or lime are at the bottom and next the condenser. For further details, and for instruction as to the methods of performing various experiments, the following books may be consulted: "The Book of the Lantern," by T. C. Hepworth; "The Optical Lantern," by A. Pringle; "Optical Projection," by Lewis Wright.*

C. H. Bothamley.

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* Any of these books can be purchased of Hazell, Watson, & Viney, Ld., 1, Creed Lane, London, E.C.

NOTES.

IN the last number of the PHOTOGRAPHIC QUARTERLY attention was called to the photographs exhibited at Liverpool by the Countess Loredana de Porto Bonin, and which were awarded a special gold medal. The Countess has graciously given us permission to reproduce "The Future Schoolmaster," and we have the pleasure of presenting it to our readers as a frontispiece to this number of the QUARTERLY. The series of pictures sent to the Liverpool Exhibition will shortly be shown at the Camera Club. Those who have the good fortune to see them will admit that the Woodbury Company have made a very excellent copy of the photograph selected by us.

The second illustration is a reproduction of a photograph by Mrs. Eveleen Myers, "The Beggar Maid," which is an exceedingly well-posed study. Mrs. Myers is first an artist, and after that a photographer. The last number of *Sun Artists* was devoted to the work of Mrs. Myers, and of it the Editor of the *British Journal of Photography* says: "The subject of the essay in this number, written by Mr. John Addington Symonds, M.A., is the photographic works of Mrs. F. W. H. Myers (*née* Eveleen Tennant), who began to study photography only at the end of 1888, with the view of taking portraits of her children. The four photogravures by which this number is illustrated are most admirable, two of them, the portraits of Robert Browning and W. E. Gladstone, M.P., being exceptionally excellent, and worth each much more than the price of the number." We know the original photographs which are reproduced, but as we are not on the review list of *Sun Artists*, it is impossible for us to express an opinion as to the faithfulness of the photogravures. Mrs. Myers' portrait of Robert Browning is perhaps the best photograph she has yet taken.

Since the last number of this magazine was published, the Camera Club have held their annual conference. Certainly the paper which attracted most attention, and we fear not for its merits, was that contributed by Mr. Pennell on the question:—"Photography as a Hindrance and a Help to Art." It will be quite understood that, before members of the Camera Club and a large number of distinguished workers in photography, Mr. Pennell would have a hard task to prove, to their satisfaction, that photography was a "Hindrance to Art," a task which he evidently set himself to achieve, but upon arguments so lame and experience so slight, that throughout the reading of the paper his opinions were received with scorn, and a very heavy discussion ensued. Mr. Pennell was unable to be present, so the committee asked him to the club, and to his credit, be it said, he accepted the invitation ; Mr. Alfred Maskell took up the cudgels for photography in a paper entitled " The Claims of Photography to Recognition as Art," which was practically a reply to Mr. Pennell's Conference paper. A most spirited discussion followed, and certainly the members had but one opinion, and that, that photography had a claim to be recognised as an art. The *Camera Club Journal* contains both papers and exhaustive reports of the discussion, the perusal of which will be instructive to all lovers of photography.

To return to the Camera Club Conference and the papers Mr. Lyonel Clark discussed " Upon the Use of Uncorrected Lenses in Photography ; " The Rev. F. C. Lambert, M.A., on " Physiological Aspects of some Problems of Art ; " Major J. Fortuné Nott on " Photography and Illustrated Journalism," a thoroughly useful teaching paper ; Mr. Henry Sutton dealt with " Electro-Phototypy ; " Professor Minchin gave a " Brief Review of Photo-Electricity ; " Mr. C. V. Boys " An Application of Photography," and Mr. H. M. Eder read a paper descriptive of some specimens of " Allotropic Forms of Silver," which had been sent over from America by Mr. Carey Lea. All these papers have been commented upon, more or less, in the photographic journals, and are only referred to here in order to keep a record of the work done at the Conference.

Not the least interesting part of the Conference programme was the exhibition of members' work at the clubhouse, many of the pictures exhibited having very distinctive merit.

The clubhouse is now complete, and is a most luxuriant home for the amateur photographer, whether a practical worker or only one of the large number of *dilettanti* who take up photography to while away the hours of their " elegant leisure."

The Vienna Photographic Exhibition has run its course, and little is really known about the photographs exhibited. Most of the English work, of which there is a large proportion, has been shown more than once here. The reports that have reached this country emanate from the Vienna Club of amateur photographers, but no *bonâ fide* criticism has yet been published. Five well-known English exhibitors contributed more than one-third of the photographs sent from this country, and that with a total of fifty-five exhibitors from the United Kingdom. We hear nothing about the Austrian work. The English photographs we all know, and the translations from the Critiques of the Vienna Press that have appeared here are many of them extremely comical.

There are many exhibitions arranged for the autumn ; in fact, we cannot help wondering whether they will all receive support—Falmouth, Cardiff, Glasgow, Leeds, Amsterdam, Brussels, etc., etc.

At a recent meeting of the members of the Photographic Society of Great Britain a considerable number of specimens of photo-mechanical printing were shown, including an example of chromo-collotype work by Mr. Bligh Bond, as given and described in the July (1890) number of the

Photographic Quarterly. This we believe to be the only example of colour-correct photography yet published. Mr. Teasdale Buckell, the editor-proprietor of *The Chase,* claims to have secured similar results, and has published two or three coloured supplements which, we understand, are produced from collotype plates; in these either the original negatives are at fault, or the best result has not been obtained in printing from the collotype plate.

Captain W. de W. Abney, C.B., F.R.S., etc., quite recently read a paper before the Photographic Society on "An Undiscussed Point in the Illumination of the Dark Room," and showed that the law of inverse squares did not hold good when lights equal to the one-millionth of a candle are used, and that with lights of the following intensities a white screen one foot distant from the source of light would be invisible:—

Red.	Orange.	Yellow.	Green.	Blue.	Violet.
$\frac{3,500}{10,000,000}$.	$\frac{1,000}{10,000,000}$.	$\frac{600}{10,000,000}$.	$\frac{10}{10,000,000}$.	$\frac{5}{10,000,000}$.	$\frac{20}{10,000,000}$.

He also stated that dark corners are better illuminated through canary medium than through ruby glass, the reason being that the former has five times more penetrating power than the latter.

The optical lantern was pressed into service at Westminster Hall a short time since, in order to give a comprehensive description and detailed account of the Oberammergau Passion Play. No less than one hundred and fifty pictures were projected on to the screen, and a lecture of great interest was delivered by Mr. Evans. By far the greater number of the slides were from photographs.

Mr. Julius F. Sachse has been making experiments in orthochromatic photography, particularly with a view to find a method of identifying the colours photographed. He first experimented upon a print of eight butterflies, selected on account of their varied colours, which included lemon-yellow, brilliant blue, blood-red, orange, bright red, and black. A colour-key was then formed of a plain white card, upon which pieces of tissue paper were fastened, matching in colour the hues of the moth. Mr. Sachse was not able to match two of the shades exactly, but the illustration, given in the *American Journal of Photography,* proves that he succeeded in representing on the negative the value of the colours—yellow, red, blue, and orange. He says that with the use of a colour screen or filterer much better results could be obtained; plates that were not orthochromatic did not prove successful.

There is doubtless much to be done in connection with photography by a careful study of the use of colour screens and the orthochromatising of plates. Those who have compared prints from an orthochromatic plate and an ordinary plate cannot fail to see the marked difference in the values and the crisp roundness of foliage and objects in the landscape. The use of orthochromatic plates has been much retarded by the action of those holding patents. It is now widely known that orthochromatising by the simplest process, erythrosin and ammonia, is protected, and any one using a formula containing these properties is subject to an action for infringement.

Dr. P. H. Emerson and Mr. T. F. Goodall have issued a pamphlet, "Notes on Perspective Drawing and Vision." The substance of this pamphlet has, through the courtesy of Messrs. Emerson and Goodall, been published in the photographic journals, and so far has raised very little discussion. The authors seek to show, by several propositions, and their own proofs, "that for scientific reasons the accepted rules of monocular perspective are likely to mislead the artist, and prove the fallacy of photographs and all mechanical methods of measurements." From the propositions and proofs they draw the deduction that: "The reason we get a different impression of relative sizes of objects by normal vision from that given by mathematical perspective drawings and photographs is, that the combination of these properties of vertical and horizontal visions gives quite a different result to that of perspective drawings. Having shown how we see forms, it only remains to say that a mathematical perspective drawing, or the drawing of an aplanatic photographic lens, does not give forms as we see them. They are altogether false to the visual impression of the proportions of things, and therefore give a wrong idea of the original scene. On the other hand, a perspective drawing or correct photograph gives the *actual facts* scientifically, *i.e.*, the pillars of the temple as leaning, the paper in experiment as square. All such drawings are therefore purely scientific diagrams, and artists who wish to render what they see must not rely upon them." Captain Abney will not endorse the opinion of Messrs. Emerson and Goodall. He said, at a recent meeting of the Camera Club, "that after examining a great deal of artistic perspective he could say it was false, whereas photographic perspective was mathematically correct."

Some very interesting photographs are on show at the Naval Exhibition, nearly all the work of officers in the service. Photography is a very favourite pastime with army and navy men, many of whom are very proficient. The camera will soon be as much a necessity in the services as the telephone or telegraph, and we believe the time is not far distant when officers and men will be told off in the army and navy for special photographic duty.

The *Journal of the Photographic Society of India* is an admirably conducted periodical, and is always eagerly read by us; it is written with much more independence than some of the English journals, and although it has not a large circulation outside the members of the society, it is most highly appreciated by the Indian amateur photographer, and reflects much credit upon the editor, Mr. Donaldson. The recent exhibition seems to have been a very pronounced success.

The exhibition promoted annually by the Royal Cornwall Polytechnic Society will be opened at Falmouth on August 25th. This exhibition is always popular, and is one of the oldest, this year's exhibition being the fifty-ninth held under its auspices. We have no data as to how many years photography has formed a section of the exhibition.

Many experiments have been made to project on to the screen, by means of the optical lantern, pictures which could be viewed stereoscopically. Dr. Schoffen has succeeded to a certain extent, and his method was demonstrated recently at the Camera Club by Mr. Woodward, of Birmingham. For the purpose he uses two lanterns side by side, and two lantern slides, taken stereoscopically, are put into them. These were thrown on the screen, and focussed accurately. In front of the right lens a red glass or screen was placed, and in front of the left a green glass. Spectacles were supplied to the audience with a green glass for the right eye, and a red glass for the left. Upon looking through these, a very decided stereoscopic effect was obtained.

Professor W. K. Burton, of Tokio, has always been an authority on all matters and details of photographic printing. He has recently perfected a new emulsion-coated printing-out paper, which is likely to work quite a revolution in printing. We understand that he will give the formula to the world. It will not be difficult for the average amateur to coat his own paper; the emulsion is easily applied to wood or other material.

The Photographic Convention of Great Britain meet this year at Bath, the session opening on the 6th inst. under the presidency of Mr. William Bedford. Several interesting papers are to be read, and photographic excursions made to the many places of interest in and around the lovely city of Bath.

The Editor of the *Photographic News*, writing upon "Clouds," says:—"In photographing cloud effects one is apt to be led away by the beauty of the colouring. A beginner in photography generally makes this mistake with every subject which presents itself. He sees on the ground glass screen a brilliant blue sky embroidered with fleecy clouds, purple hills in the distance, relieved, perhaps, by brilliant green trees, and grass bespangled with cowslips in the foreground. 'What a lovely effect!' thinks he, and he takes a photograph, only to find out, later on, what a mistake he has made in supposing that such a view could make a satisfactory picture in monochrome. But more experienced eyes are apt to be deceived in this way by the wondrous colouring of cloudland, and forget that they must study only form and light and shade. A man who is colour-blind would probably make the best photographer of clouds, and an engraver, used to shutting his eyes to colour, would do as well."

Many improvements have been made of late years in optical lanterns; but it has been left to Professor Barr, D.Sc., and Professor Stroud to design a really perfect apparatus for the preparation of lantern slides from illustrations in books, periodicals, loose engravings, sketches, photographic prints, negatives, etc. We have not space to give a full description of the apparatus; but *The Photographer* (Glasgow) for June devotes considerable space to describing the apparatus and the method of using it. As the lantern is now so largely used in schools and colleges, any apparatus that will assist and expedite the production of lantern slides will meet with a ready sale.

The report of the Astronomer-Royal contains many proofs of the enormous assistance photography has been, and how largely it enters into the every-day work at the Royal Observatory. The report states that—"The preparatory work for the photographic map of the heavens has occupied a good deal of attention during the past year, a number of new questions being raised in this application of photography to systematic astronomical work which have necessarily required careful consideration on the part of the chief assistant and myself. Under these circumstances the want of increased supervising power for the Observatory has been severely felt, and this want has not been in any way met by the appointment, after a long delay, of an additional second-class assistant. The recent meeting at Paris of the International Committee for the photographic map, in which I took part, settled the bases of the work in a general way; but for working out the details, both practical and theoretical, much remains to be done, and, under the existing conditions of the Observatory staff, it is difficult for the chief assistant and myself to supervise this adequately, and to deal effectually with the important points of principle involved in the discussion of the excellent photographs which have been obtained by Mr. Criswick and his assistants."

In an article headed "A Problem for Plate Makers," published in the *British Journal*, the writer says: "The problem for the dry-plate makers is to produce a film which shall permit few actinic rays to pass through, and also which shall be of such a colour that when the image of bright objects is thrown upon it the reflections from the lens back to the film shall be innocuous. Our views as to how this desideratum is to be realised may be briefly stated. We say, 'Stain the film,' or, in other words, add a dye to it, so that when the plate is made it is distinctly coloured, and so would keep back the greater part of the light from passing through, and also render harmless the less-reflected illumination of the front of the film. It may be answered that, if such effects were produced, their advantages would be nullified by loss of rapidity, entailed by the light being obstructed through this dyeing operation. We reply that we have every reason to believe that this objection is untenable, and we express a strong opinion that the first plate-maker who will carry out our suggestion will produce a plate possessing such marked advantages over all others that he would practically 'sweep the board.'"

At a recent meeting of the Stereoscopic Club (Manchester), Mr. W. I. Chadwick read a paper upon a "Monocular" stereoscopic camera, which was illustrated with diagrams. This club has already a large number of members, and stereoscopic work is being extensively practised by them.

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